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SYNOPSIS

OF THE

FAMILIES AND GENERA

OF

NORTH AMERICAN DIPTERA.

WITH

BIBLIOGRAPHY AND NEW SPECIES, 1878-88.

BY

SAMUEL W. WILLISTON,
Professor of Anatomy, Yale University.

NEW HAVEN:
J. T. HATHAWAY, PUBLISHER.
1888.

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SYNOPSIS

Families and Genera of N. A. Diptera.

Page 13

29 Anal cell narrowly open, or closed near the margin; discal cell present (in our genera). . . . . Bombylidæ.

Anal cell closed remote from the border, sometimes wanting; if closed near the border (Hilarimorpha), the discal cell wanting. . . . . Empidæ.

Page 40

1. Antennæ with a terminal bristle. 3
   Antennæ without terminal style or bristle. 2
2. Antennæ short, third joint rounded, with terminal bristly hairs. 3
   Antennæ elongate. 6
3. Antennæ inserted near the vertex. 5
   Antennæ inserted near the mouth. 4
4. Wings with a stout costal spur near the tip of auxiliary vein. Pterodontia
   Wings without such spur; anal cell absent. . . Oncodes
5. Venation complete; eyes pilose. . . . . Opsebius
   Veins more or less obsolete: eyes bare. . . . Acrocera
6. Proboscis rudimentary. . . . . Ocnæa
   Proboscis elongate. 0
7. Ocelli wanting; large flies. . . . . Lasia
   Ocelli present; smaller flies. . . . . Eulonchus

Page 81

127 Bigot, J. F. M. Bull. Soc. Ent. Fr. 1887, CXL–CXLII. [Blepharopeza trichopis, Mex.; Cryptopalpus melanopygatus, Wash. Terr.; Elachipalpus nigrifrons, Mex.; Hilarimorpha obscura, Calif.; Rhamphomyia Morrisoni, Nev., pachymera, nigrita, geniculata, Calif.]

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9. Third longitudinal vein furcate. 10
   Third vein simple, not furcate. . . . Rhamphomyia

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SYNOPSIS

OF THE

FAMILIES AND GENERA

OF

NORTH AMERICAN DIPTERA,

EXCLUSIVE OF THE GENERA OF THE NEMATOCERA AND MUSCIDÆ,

WITH

BIBLIOGRAPHY AND NEW SPECIES, 1878-88.

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NORTH AMERICAN DIPTERA.

INTRODUCTION.

The writer has, during the past five years, published in different periodicals various synoptic tables of the families and genera of North American Diptera. The intention was, at first, to reprint these with revisions, that they might be more accessible to those interested in this order of insects. In order to make, it is trusted, the tables of more service, those of other families have been added, either as compiled or reproduced from standard authorities, or prepared from the examination of specimens in the author's collection. It will be understood, however, that, in not a few families, the present condition of American dipterology does not admit of the preparation of synopses free from error; the writer's acquaintance, too, with not a few families, has been less complete than with others, and it is very true that only he who has made a critical study of abundant material is competent to compile such tables with much success. For this reason, the tables of genera in the Nematocerous and Muscid families have been omitted. It may be mentioned that very nearly all the genera defined in the present work have been examined by the writer, though not all with the same degree of critical study. The faunal limits embraced are those north of Mexico; and whenever extralimital forms are introduced they will be found preceded by a °.

The student will soon learn that the characters of many flies are not so simple and apparent as a mere synoptic table would indicate them to be. He will often be puzzled at the interpretation of characters, even after he has acquired a considerable experience. Furthermore, it is often necessary to study any author a considerable time before he becomes thoroughly familiar with his peculiarities of style and modes of expression; he must become, one may say, familiar with the personal equation of each writer before he can feel confidence in the results obtained from him. It is precisely those authors who reduce that personal equation to the minimum who are most successful as describers. One, for instance, may feel confident of a determination of a species described by Macquart,

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where the same description under Osten Sacken's name he would feel certain did not apply. Doubt of the right generic location of a specimen may often be surest dissipated by attempting to refer to some species. In fact the only way that the present writer was enabled to generically determine the larger part of his species in his earlier studies was by first ascertaining the species. Until the student has acquired a sort of intuitive acquaintance with the different families, the work will often be tedious, but, by perseverance, he can not fail to overcome whatever obstacles families and genera may present. He will be very much aided, at the beginning, however, by having a tolerably large collection at his command—already named by some one else if convenient—by which to make comparisons. Difficulties to the inexperienced will often disappear, with positive evidence before him, where negative characters are puzzling.

To determine his species the student will need a large series of papers, a list of which up to 1878, will be found in Osten Sacken's Catalogue, and from that time to the present in the concluding pages of this work. But, very much can be done with a much smaller and more accessible list. After he has become acquainted with the order in general, he can select any particular group and procure the papers for systematic work in that group at comparatively small expense. Much the larger part of the descriptions, it is true, will be found in foreign languages, but that need not deter him; descriptive phraseology is very simple, and it needs but a little exertion to become sufficiently acquainted with the four or five languages to read descriptions in them with ease or even to write them, if need be. A thorough knowledge of the German, however, is absolutely essential before much headway can be made. As in many other branches of biology, German literature is by far the most important and abundant—indeed it is almost a matter of doubt whether the balance between the bad and good in dipterological literature by the French, English and Italian authors is not almost equal, and this without intimating anything against the really good authors these countries have produced: Walker, Desvoidy and Lioy make a combination hard to match in any branch of science.

The following works are to be commended for the use of the beginner

OSTEN SACKEN. Catalogue of Diptera, 2d edition, Smithsonian Institution, 1878.

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SCHINER. Fauna Austriaca, Diptera. 2 vols. Vienna, 1862–64.
LOEW and OSTEN SACKEN. Monographs of North American Diptera. 4 vols. Smithsonian Institution, 1862–72.
WILLISTON. Synopsis of the North American Syrphidæ. Bull. U. S. National Museum, No. 31, 1886.
OSTEN SACKEN. Prodrome to a Monograph of the Tabanidæ. Boston Soc. Nat. Hist. 1875–8.
LOEW. Diptera Centuriæ, 1860–1872. (One thousand new N. A. species.)
WIEDEMANN. Aussereuropaeische Zzeifluegelige Insekten, 1828–30.
MACQUART. Dipteres Exotiques Noveaux ou peu Connus. 2 vols. and 5 supplements, 1838–55.
MEIGEN. Systematische Beschreibung der Europalschen Zweifluegeligen Insekten, 1818–38. (Useful for the figures.)
OSTEN SACKEN. Biologia Centrali-Americana, Diptera, 1886. (Access to this work can only be obtained in large libraries.)
SCHINER. Novara Expedition, Diptera, 1868.
MACQUART. Histoire nat. des Dipteres, Suites a Buffon. 2 vols. 1835.

The above list has been arranged in about the order in which the works will prove the most useful.

In order to render the tables and descriptions intelligible to the student wholly unacquainted with this order of insects, for whom, indeed, the present work is more especially intended, some brief descriptions of the peculiar terminology is necessary. The terminology here used is essentially that of Loew, who gives a fuller exposition of it in the first volume of his monographs, works which, with Osten Sacken's more recent catalogue, will be of first importance to all those who would pursue the study further than that of mere separation into families and genera.

TERMINOLOGY OF DIPTERA.—The large compound eyes are present in all diptera, except some pupipara. In the majority of males they are contiguous on the upper part (HOLOPTIC), rarely so in the females. The narrow border, immediately surrounding them is the ORBIT, indicating often a more or less indefinite space. When the eyes are separated (DICHOPTIC), as they are in most females and many males, the space between them, limited above by the upper margin of the head, or VERTEX, and below by a line drawn across the base of the antennæ, is called the FRONT; on the lower part of the front, in most diptera cyclorrhapha, there is a crescentic space (FRONTAL LUNULE) separated by an impressed line. On the upper part of the front, near the vertex, there are usually three, rarely two, often no, simple, small eyes, called OCELLI—their presence or absence is an important character. In the holoptic male, the triangle upon which these ocelli are situated, limited in front by the eyes,

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behind by the vertical margin, is known as the OCELLAR, or VERTICAL, triangle; a similar triangle below, above the base of the antennæ, is called the FRONTAL TRIANGLE. Below the antennæ, the space, limited by the oral margin, the cheeks and the eyes, is the FACE, and characters drawn from it are of the highest value in specific classification. The space below the eyes, indefinitely limited in front by the face, and behind by the margin of the OCCIPUT (the posterior surface of the head) is the CHEEK. Of the mouth-parts, the PROBOSCIS, when not rarely absent, with its terminal, often fleshy, scraping or suctorial flaps, the LABELLA, and the one to five jointed PALPI at the base, is the most important. The oral margin of the face is sometimes spoken of as the peristoma, or hypostoma, but the more common and better term is EPISTOMA. Of the antennæ, the third joint, in the brachycerous and cyclorrhaphous diptera, usually bears a bristle (ARISTA), or STYLE.

The THORAX is composed, as in other insects, of three parts, the PRO-thorax, MESO-thorax, and META-thorax, but the first and and the last are so aborted as to present but few anatomical characters. The prothorax is perhaps most readily distinguished in the nematocerous flies, forming a rounded COLLAR, back of the NECK. The metathorax is not seen at all from above; the SCUTELLUM, a semi-oval body behind, cut off by an impressed line, really belongs to the mesothorax, the dorsum of which is often called the MESONOTUM. Across, near the middle of the mesonotum, there is an impressed line, terminating on each side a little in front of the wings, that is known as the TRANSVERSE SUTURE. The anterior superior angles of the thorax are the HUMERI, or humeral CALLOSITIES, and on the margin of the mesonotum, between the wings and the scutellum, there is, on each side, an oval, obtuse process, named the POSTALAR CALLUS. Limiting the mesonotum, running from the humerus to the wing, is the DORSO-PLEURAL SUTURE; below it, the whole side of the thorax forms the PLEURA, divided by sutures into smaller spaces called the MESO-pleura, STERNO-pleura, HYPO-pleura, and META-pleura. The under part of the thorax is the PECTUS or breast. The oval, arched portion behind, beneath the scutellum, is the METANOTUM, and, on either side, we see a slender organ with a knob-like head, the aborted second pair of wings, and known as the balancers, poisers, or HALTERES. Above them, and back of the base of the wings, are the more or less well-developed membranous scales, the TEGULÆ.

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The term ABDOMEN is usually applied to the upper side of the third principal part of the insect, only; for the under side we use the term VENTER. At the terminal part of the male abdomen, are the sexual appendages, to which the name HYPOPYGIUM is applied. In the female, the corresponding part is the OVIPOSITOR.

To understand the neuration of the WINGS, let the student select for comparison a common large horse-fly (Tabanidæ) and a common house or blue-bottle fly (Muscidæ). Observe in the former, near the middle of the wing, directed transversely, a large, oblong, five or six-sided cell, surrounded on all sides by other cells. This is the DISCAL cell, and is present in nearly all flies. Some. where on the vein (FOURTH LONGITUDINAL) that bounds this cell in front, will be seen a short connecting vein, directed anteriorly; this is the ANTERIOR OR SMALL CROSS-VEIN, and affords, in most cases, a key to the neuration, no matter how intricate. It always connects the fourth longitudinal vein behind with the third longitudinal in front; the cell behind it is the discal, in front the SUBMARGINAL, on the outer side the FIRST POSTERIOR, on the inner side the FIRST BASAL. Lying parallel with the first basal cell, and just behind it, is the SECOND BASAL cell; just behind the second basal cell is the THIRD BASAL OR ANAL cell. In the horse-fly, the anal cell is seen to run back obliquely to near the posterior margin of the wing, where it terminates acutely, that is, the anal cell is said to be closed near the border of the wing; should the two veins that close it run separately into the wing's margin, then the cell is open. Now, counting outwardly along the posterior border to the third longitudinal vein (posterior branch), there will be seen five posterior cells, all open (except in a few species of our Tabanidæ the first posterior cell is closed), with their bases bordering on the discal and first and second basal cells. By following the third longitudinal vein outwardly from the anterior cross-vein, it is seen to give off an anterior branch, which runs to terminate in the front margin or COSTA of the wing; the third longitudinal vein is here furcate, and two submarginal cells are present. Compare now these same structures in the house-fly, and the discal is found much more elongated, the basal and anal cells small, the third longitudinal vein simple, not furcated, and only one submarginal and three posterior cells are present. Do not confound the obliquely placed vein that nearly closes the first posterior cell with the furcation of the third vein. The house-fly will also show clearly the six longitudinal veins, the last of which runs obliquely backward from the anal cell toward the margin, the fifth bordering the discal cell behind, the first and second running into the costa. The first vein that terminates in the costa (before the middle of the wing) is the AUXILIARY. The vein that closes the discal cell outwardly is the POSTERIOR OR GREAT CROSS-VEIN; the vein that closes the anal cell outwardly, the POSTERIOR BASAL CROSS VEIN.

By comparing the tip of the TARSI (feet) in the two above-mentioned flies, the student will immediately observe what is meant by the expression "empodia developed pulvilliform." The middle membranous appendage on the underside of the claws (UNGUES) in the horse-fly is the pulvilliform EMPODIUM, while in the house-fly the

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outer ones, the PULVILLI, alone are present. The TARSUS, composed of five joints, the proximal one of which is called the META-tarsus, the TIBIA, the FEMUR, and the COXA, attaching the leg to the thorax, will be readily understood.

A few words only, as regards the collection and preservation of flies. Moisture of any kind spoils all specimens; for that reason they should always be pinned, and never preserved in fluids. Further, the collecting bottle should be carefully lined with blotting paper to absorb the moisture exhaled. Many flies are injured by rubbing or handling. Specimens should always be pinned, never glued to cards.

CLASSIFICATION OF THE DIPTERA.—Professor Brauer has recently published* a classificatory system of Diptera, based upon the immature and mature stages, which, as the most recent exposition by one recognized as an authority in the classification of insects in general, is worthy of acceptance, at least in greater part. It will be difficult to supplant some of the names already in use, such as the Muscaria calyptratæ, etc., nor is such desirable; but names, here as elsewhere, are wholly of secondary importance—the facts or views to which such give expression are all that we at present care for. His system is as follows:

Sub-order ORTHORRHAPHA.

NEMATOCERA.	Tribe EUCEPHALA.		Mycetophilidæ, Bibionidæ, Chironomidæ, Culicidæ, Blepharoceridæ, Simulidæ, Psychodidæ, Ptychopteridæ, Rhyphidæ.
	Tribe OLIGONEURA.		Cecidomyidæ.
	Tribe POLYNEURA.		Limnobidæ, Tipulidæ.
BRACHYCERA.	Tribe ACROPTERA.		Lonchopteridæ.
	Tribe ORTHOGENYA.		Empidæ, Dolichopodidæ.
	PLATYGENYA.	HOMOODACTYLA.	Notacantha. Stratiom., Xyloph.
			Tanystoma. Tabanidæ, Acanthomeridæ, Leptidæ.
			Bombylimorpha Acroc., Nemistr.
		HETERODACTYLA.	Procephala. Mydaidæ, Asilidæ, Bombylidæ.
			Polytoma. Therevidæ, Scenop.

Sub-order CYCLORRHAPHA.

ASCHIZA	Tribe SYRPHIDÆ.	Syrphidæ, Pipunculidæ.
	Tribe HYPOCERA.	Phoridæ, Platypezidæ.
SCHIZOPHORA.	Tribe EUMYIDÆ.	Schizometopa. Muscidæ calyptratæ.
		Holometopa. Muscidæ acalyptratæ.
	Tribe PUPIPARA.	Hippoboscidæ, Nycteribidæ.

* Denkschr. d. k. Akad. d. Wissensch. XLVII. 11, 1883.

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TABLE OF FAMILIES.

1. Flies of a leathery or horny structure, living parasitically in the adult state upon warm-blooded vertebrates; head small, either closely united to the emarginate anterior part of the thorax, or folding back into a groove upon the dorsum; mouth-parts incomplete, the palpi wanting; legs separated by the broad sternum; abdomen indistinctly segmentated; claws well developed. 49

   Flies of softer structure, never living parasitically in the adult state upon warm-blooded vertebrates; head separated from thorax by a free neck. 2

2. Antennæ many-jointed, often longer than the thorax, the two basal joints, only, differentiated, the remaining joints usually distinct; palpi composed of from three to five joints, usually elongate; anal cell never closed or narrowed at the margin.* (Nematocera.) 3

   Antennæ rarely as long as the thorax, composed primarily of three joints, the third of which may be simple or complex, (that is, composed of more or less distinct annuli or segments,) with or without a terminal or dorsal arista or style; anal cell closed before the border, or distinctly narrowed in the border, or, if other structure, the antennæ composed of three simple joints; palpi rarely much elongate, composed of from one to three joints. 12

3. Dorsum of thorax with a distinct V-shaped suture†; wings (wanting in Chionea) many-veined, often with a complete discal cell; ocelli wanting (present in Trichocera); often large flies. . . . . TIPULIDÆ

   Dorsum of thorax without a V-shaped suture, or rarely with any transverse suture (Blepharoceridæ.) 4

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* Plecia, and perhaps some others, may be exceptions.

† Bittacomorpha, Ptychoptera, and Idioplasta will alone cause doubt here. They have the suture incompletely V-shaped and sinuous. The last will be distinguished from Rhyphidæ chiefly by the absence of ocelli; the two former will be separated from the Culicidæ by the absence of hair on the veins, their large size, and in Bittacomorpha by the peculiar clubbed tibiæ.

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4. A complete discal cell present; ocelli present; empodia developed pulvilliform, pulvilli rudimentary. RHYPHIDÆ
No discal cell. 5

5. Wings with only a few longitudinal veins, and no cross-veins; coxæ not elongate, tibiæ without terminal spurs, legs not thickened; ocelli present or absent; small or minute, delicate, mostly gall-producing flies. . . . CECIDOMYIDÆ
Not such flies, wings usually many-veined. . . . 6

6. Ocelli present. 7
Ocelli wanting (compare Mycetophilidæ.) . 9

7. Wings broad, bare, characteristically marked by numerous folds between the veins, giving a netted, spiderweb-like appearance. . . . . BLEPHAROCERIDÆ
Wings not so marked; no entire transverse suture. . 8

8. Coxæ much elongated (moderately so in Sciarinæ); antennæ often elongate, the joints constricted; three or two ocelli (in the latter case situated near the eyes, and often hardly perceptible); all the tibiæ with spurs. . MYCETOPHILIDÆ
Coxæ short, the thorax rounded, not humped, above; antennæ shorter than the thorax, thickened, the joints closely united without marked constrictions; legs strong, the front femora often thickened; empodia pulvilliform, the pulvilli sometimes absent; eyes of male large. . . . BIBIONIDÆ

9. The costal or marginal vein does not extend beyond the tip of the wing. 10
The marginal vein encompasses the entire wing. . . . 11

10. Antennæ slender, the joints more or less constricted, and often bushy plumose; legs slender, hind tibiæ and metatarsi never dilated; body and abdomen slender; wings narrow. CHIRONOMIDÆ
Antennæ shorter than the thorax, the joints broadly and closely united, without marked constrictions, and never hairy or pilose; legs strong, hind pair more or less dilated; body thick-set, abdomen ovate; wings broad, bare, the anterior veins stouter, the posterior ones weak. Black-flies, buffalo-gnats. SIMULIDÆ

11. Wings distally, with ten longitudinal veins, without cross-veins, broad, pointed, veins strongly hairy; tibiæ without terminal spurs; small, lepidoptera-like flies, the wings, when at rest, folded roof-shaped. . . . . PSYCHODIDÆ

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Wings with small cross-veins near the middle, not broad and pointed, the veins hairy and conspicuously fringed along the hind margin; wings when at rest not roof-shaped. Mosquitoes. . . . . CULICIDÆ

12. Third joint of the antennæ complex; basal cells of wings long. 13
Antennæ composed of three simple joints, the third not annulated or segmentated, with or without a dorsal arista, or terminal style or arista. 19

13. Empodia undeveloped or bristle-like; antennæ elongate, composed of four or five joints, without differentiated style or arista; vertex and front hollowed out transversely between the eyes; eyes of male never contiguous. . . . 26
Empodia developed pulvilliform; third antennal joint more or less distinctly segmentated or annulated; body not bristly 14

14. Tegulæ rather large; third longitudinal vein furcate; five posterior cells always present; the costal vein encompasses the whole margin of the wing; proboscis of the female adapted for piercing; third joint of antennæ with from three to eight annuli, never with style or bristle. Horseflies. . TABANIDÆ
Tegulæ small or rudimentary; mostly flower-flies. (See Notacantha.) 15

15. Tibiæ wholly without terminal spurs; longitudinal veins of the wings usually crowded anteriorly, those posteriorly often weak; the costal vein does not reach beyond the tip of the wing; antennæ long or short, with or without a terminal or dorsal arista or terminal style. . . STRATIOMYIDÆ
The middle tibiæ at least, with distinct spurs; the costal vein encompasses the entire wing; third longitudinal vein always furcate, and five posterior cells always present. . . 16

16. All the tibiæ with spurs; third joint of antennæ sometimes divided into separate divisions. . . . XYLOPHAGIDÆ
Front tibiæ without spurs. 17

17. Fourth posterior cell of wings closed (Subula). STRATIOMYIDÆ, pt.
Fourth posterior cell open (Arthrocerinæ.) . . 18

18. Face projecting on each side into a rounded conical protuberance. . . . . GLUTOPS
Face with two diverging furrows. . . . ARTHROCERAS

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19. Antennæ apparently single-jointed, with a long bristle; wings with several stout veins anteriorly, and other weaker ones running across the surface unconnected by cross-veins; femora flattened, the hind legs long; antennæ situated near the mouth; small, quick-running, hunchback-like flies. PHORIDÆ
Not such flies. 20

20. Empodia developed pulvilliform, that is, three nearly equal, membranous appendages on the under side of the claws. 21
Empodia wanting, rudimentary or linear, not developed like the pulvilli. 23

21. Tegulæ very large, inflated; thorax and abdomen inflated; head small, eyes very large; neuration varied. ~~CYRTIDÆ~~
Tegulæ of moderate size or rudimentary. 22

22. Middle tibiæ, at least, with spurs, no bristles on femora or tibiæ; third longitudinal vein furcate; five posterior cells present (four in Agnotomyia); anterior cross-vein always distinct; third joint of the antennæ with a bristle or slender style, usually terminal. . . . . LEPTIDÆ
Not such flies. 23

23. Third longitudinal vein of the wing simple, not furcate. . 32
Third longitudinal vein furcate, two or more submarginal cells present. 24

24. Arista or style of antennæ, when present, always terminal. 25
Arista dorsal, always present. 37

25. Vertex and front distinctly hollowed out transversely between the eyes; eyes of male never contiguous; basal cells large; mostly large flies. 26
Front and vertex plane or convex; eyes of male often contiguous. 27

26. Proboscis without fleshy labella at the tip, the under part forming a horny sheath; the posterior branch of the third vein terminates behind the tip of the wing; five posterior cells always present; predaceous flies. . . . . ASILIDÆ
Proboscis with fleshy labella at the tip; neuration complicated, the third vein, at least, curves forward to terminate before the tip of the wing; antennæ with a terminal flattened lamella. . . . . MIDAIDÆ

27. Five posterior cells in the wing; basal cells large. . . 30
Never more than four posterior cells in the wing. . . 28

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28. Third antennal joint without bristle or style; three posterior cells; first posterior cell narrowed or closed, the fourth longitudinal vein terminating at or before the tip of the wing. SCENOPINIDÆ

Third antennal joint rarely without terminal style; four or three posterior cells; the fourth vein terminates beyond the tip of the wing. 29

29. Anal cell narrowly open, or closed near the border. BOMBYLIDÆ

Anal cell closed remote from the border. . . . . EMPIDÆ

30. Neuration intricate, the small cross-vein wanting or rudimentary, owing to the coalescence of the third and fourth veins for a longer or shorter distance; tibiæ without terminal spurs; empodia and pulvilli membranous, but frequently minute. NEMESTRINIDÆ

Neuration not intricate; the anterior cross-vein always distinct; labella of proboscis fleshy. 31

31. The posterior branch of the third vein terminates before the tip of the wing; male sexual organs prominent. . APIOCERIDÆ

The posterior branch of the third vein terminates behind the tip of the wing; male sexual organs small. . THEREVIDÆ

32. Antennæ with a dorsal arista. 38

Antennæ with a terminal arista or style. 33

33. Wings pointed, no cross-veins in the middle, the fourth longitudinal furcate and united with the fifth; small species. LONCHOPTERIDÆ

Wings rounded at the tip, not lancet-like. . . . 34

34. Second basal cell confluent with the discal cell, not separated by a small vein; the auxiliary vein does not terminate in the costa; small, mostly brilliant-colored, predaceous flies. DOLICHOPODIDÆ

Second basal cell separated from discal cell by a small vein. 35

35. Antennæ with a terminal style. 36

Antennæ with a terminal bristle. 37

36. First posterior closed (Conopidæ, pt., Syrphidæ, pt.) 41

First posterior cell open. . . . . EMPIDÆ

37. Head comparatively small; the proboscis usually more or less elongated; alulæ of wings usually rudimentary. EMPIDÆ

Head as broad as the thorax; proboscis fleshy; alulæ distinct. PLATYPEZIDÆ

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38. Proboscis rudimentary, palpi wanting; first posterior cell usually narrowed; tegulæ usually large. Botflies. . ŒSTRIDÆ
Proboscis not rudimentary; palpi present. . . . 39

39. Second basal cell confluent with the discal cell; not separated by a small vein; small, mostly brilliant-colored, predaceous flies; face never broad and convex. . DOLICHOPODIDÆ
Second basal cell separated from the discal cell by a small cross-vein (or, if not, not brilliant-colored, predaceous flies, and the face always broad and arched, Ephydrinæ.) . . 40

40. Posterior basal cells of wing elongate; the anal cell closed toward the margin; first posterior cell closed or much narrowed (except sometimes in Pipunculidæ.) . . . 41
Posterior basal cells of wings small; the anal cell always closed remote from the margin. 43

41. Face with sub-antennal vertical grooves or depression. (Conopidæ, pt.) 43
Face convex transversely, or with a median ridge; never with a sub-antennal depression. 42

42. Between the third and fourth longitudinal veins, and sub-parallel with them, crossing the anterior cross-vein, a spurious longitudinal vein, or, when rarely not present, the first posterior cell closed a considerable distance from the border; eyes never extraordinarily large; abdomen without bristles. SYRPHIDÆ
Spurious vein never present; first posterior cell never closed before the margin; eyes very large, including the largest part of the head; small species. . . PIPUNCULIDÆ

43. Proboscis horny, elongate, often folding back near the middle; abdomen never with bristles; tibiæ without terminal spurs (or, if with them, the face with a median ridge, and the proboscis folding;) first posterior cell closed or narrowed. CONOPIDÆ
Proboscis fleshy and not elongate, (or if elongate and slender, with or without a median hinge, the abdomen with distinct bristles, or the bristle of antennæ plumose.) . . 44

44. Tegulæ large; face with sub-antennal vertical grooves or depression. (Muscidæ calyptratæ.) . . . 45
Tegulæ small. . . . . MUSCIDÆ ACALYPTRATÆ

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45. First posterior cell widely open, not narrowed in the margin. ANTHYOMYIDÆ
First posterior cell closed, or more or less narrowed. . 46

46. Antennal arista wholly bare. . . . . TACHINIDÆ
Antennal arista distinctly pubescent or plumose. . . 47

47. Arista bare on the distal part; dorsum of abdomen rarely bristly before the distal part . . . . SARCOPHAGIDÆ
Arista plumose or pubescent to the tip. 48

48. Dorsum of abdomen bristly; legs usually elongate. DEXIDÆ
Abdominal segments without bristles, except sometimes somewhat near the tip. . . . . MUSCIDÆ

49. Wingless flies, parasitic upon bats; head not flattened, folding back upon the dorsum of the thorax; first joint of tarsi not abbreviated. . . . . NYCTERIBIDÆ
Winged or wingless flies, parasitic upon birds or quadrupeds; head flattened, sunk into a shallow emargination of the thorax; first joint of the four anterior, or all, tarsi abbreviated. . . . . HIPPOBOSCIDÆ

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FAMILY CHARACTERS AND SYNOPSES OF GENERA.

NOTACANTHA.

Empodia developed pulvilliform, pulvilli present. Without distinct bristles. Basal cells of wings large. Third joint of antennæ segmented or annulated. Tegulæ small or rudimentary. Proboscis not adapted for piercing. Males holoptic or dichoptic.

1. Tibiæ wholly without spurs; veins usually crowded anteriorly. . . . . STRATIOMYIDÆ
   Tibiæ more or less spurred; the costal vein encompasses the whole wing; two sub-marginal and five posterior cells always present. 2
2. All the tibiæ with spurs. 3
   Front tibiæ without spurs. 4
3. Third joint of antennæ not acute at tip, or, if so, the scutellum with spines on its border. . . . XYLOPHAGIDÆ
   Third joint acute; palpi cylindrical; scutellum without spines. ARTHROPEAS
4. Fourth posterior cell closed. . . . . SUBULA
   Fourth posterior cell open. (Leptidæ.) 5
5. Face projecting on each side into a rounded conical protuberance, thickly covered with hair. . . . . GLUTOPS
   Face with two deep, diverging furrows, running from the base of the antennæ to the oral margin. . . ARTHROCERAS

XYLOPHAGIDÆ.

Species of moderate or large size, more or less elongated, thinly pilose, or nearly bare. Ocelli present. Antennæ elongate, third joint annulated or segmentated, never with a differentiated style or bristle. Veins of the wings distinct, not crowded anteriorly, third longitudinal vein furcate; five posterior cells. Abdomen with seven or eight visible segments. All the tibiæ with spurs at the tip.

The flies are usually found about trees, where they feed upon the sap, or about decaying logs, and are often mistaken for ichneumonids.

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1. All four posterior veins arise from the discal cell; head small; scutellum with spines. . . . . CŒNOMYIA
   The last posterior vein arises from the second basal cell; head not small; scutellum without spines. 2
2. Fourth posterior cell closed; third joint of antennæ much elongate, composed of numerous distinct divisions, often pectinate; eyes emarginate near the antennæ. . RHACHICERUS
   Fourth posterior cell open; third joint of antennæ composed of eight annuli, indistinctly separated. . . XYLOPHAGUS

RHACHICERUS Haliday, in Walker, List, etc. V, 103, 1854.
XYLOPHAGUS Meigen, in Illiger's Magazine, II, 266, 1803.
BOLBOMYIA Loew, Bernstein und Bernsteinfauna, 39, 1850.
CŒNOMYIA Latreille, Precis des Caract. Gener. etc. 1797.
SUBULA Meigen, Syst. Beschr. II, 15, 1820.
ARTHROPEAS Loew. See Leptidæ.
ARTHROCERAS Williston. See Leptidæ.
GLUTOPS Burgess. See Leptidæ.

STRATIOMYIDÆ

Head large, hemispherical. Antennæ situated at or below the middle of the head in profile, short or elongate, the third joint composed of more or less distinct annuli; usually with a more or less differentiated style, or bristle. Eyes bare or pilose; ocelli present. Scutellum often with thickened spine-like points. Abdomen elongate, clavate, oval, or rounded, flattened or convex above, of five or more visible segments. Legs never very stout, often slender, tibiæ without spurs (except in some exotic genera.) Wings usually with the veins more or less crowded anteriorly, often on the outer posterior part weak and faint; third longitudinal vein usually furcate, terminating before the tip of the wing; four or five posterior cells, all open, the posterior veins not seldom more or less rudimentary.

Species from three or four to twenty or more millimeters in length, bare or moderate pilose. They are mostly flower-flies, and are often found upon vegetation in the vicinity of damp places. Larvæ pupigerous, that is the pupæ remain within the larval skin till ready to emerge as perfect insects.

1. Abdomen with seven visible segments. . . BERIDINÆ
   Abdomen with only five or six visible segments. . . . 2

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2. Three posterior veins, all discal. . PACHYGASTRINÆ
   Four posterior veins, the anterior ones sometimes rudimentary. 3
3. All the posterior veins discal, the last posterior cell contiguous at its base with the discal cell. 4
   The last posterior vein arises from the second basal cell, the last posterior cell not contiguous at its base with the discal cell. 5
4. Third antennal joint with a long, delicately fringed, lamelliform style; usually large, more or less elongated species; males dichoptic. (Hermetiinæ.) . . . . HERMETIA
   Third joint not with such a style; abdomen short, not more than twice as long as broad. . . . CLITELLARINÆ
5. Antennæ with a slender dorsal or terminal bristle. SARGINÆ
   Antennæ never with a slender or long bristle. STRATIOMYINÆ

BERIDINÆ.

Abdomen with seven visible segments in the male, in the female with an additional ovipositor. Wings with a stigmatic spot; all the posterior veins arise from the discal cell.* Abdomen flattened.

1. Three posterior veins; occiput flat. 2
   Four posterior veins; scutellum with spines. 3
2. Scutellum with spines; palpi rudimentary. . . . BERIS
   Scutellum without spines (Metoponia Lw., non Macq.) ALLOGNOSTA
3. Occiput excavated; hind femora thickened at the extremity. NEOXAIRETA
   Occiput flat, hind femora simple; last two abdominal segments small. . . . . SCOLIOPELTA

SARGINÆ.

Body usually elongate; rather small, nearly bare species. Four posterior veins, the last one arising from the basal cell, Antennæ short, the third joint rounded or subquadrate, with an apical or preapical arista. Scutellum without spines on its border. [Occiput deeply excavated.]

1. Anterior ocellus more widely separated than the other two; males holoptic or dichoptic. 2
   Ocelli equidistant, more approximate. 3

*Variable in Beris.

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2. Abdomen contracted toward the base, clavate, pedicellate. MACROSARGUS
   Abdomen not pedicellate in the male, in the female the second segment not concave on the sides. . . . SARGUS
3. Second antennal joint prolonged on its inner side into a projection, extending on, and closely lying upon, the third joint. PTECTICUS
   Second joint not with such a projection. 4
4. Males dichoptic; eyes bare. . . . . CHRYSONOTUS
   Males holoptic; posterior veins weak. 5
5. Eyes thickly pilose. . . . . CHLOROMYIA
   Eyes bare, deep metallic species; front very broad in the female; arista terminal; abdomen short; eyes of male with an area of enlarged facets above. . . . . MICROCHRYSA

STRATIOMYINÆ.

Rather large species, the abdomen usually ovate and more or less thickened. Five posterior cells; often, however, one or more of the three veins that arise from the discal cell is faint or rudimetary, and the cells coalescent: in such cases the discal cell will usually show angulations, indicating their origin. The last posterior vein is nearly always distinct, and arises from the second basal cell. Anterior veins often crowded toward the front. Antennæ never with a long or slender bristle.

1. First antennal joint three or four times as long as the second; scutellum with spines. . . . . STRATIOMYIA
   First antennal joint not three times as long as the second. . 2
2. Face projecting conically downward; small species. MYXOSARGUS
   Face not projecting downward in a cone; abdomen not elongate. . . . . ODONTOMYIA

CLITELLARINÆ.

Abdomen short, usually but little longer than broad; four posterior veins, all of which arise from the discal cell. Small or moderately large species, nearly bare.

1. Scutellum without spines; face produced below into a projecting cone; posterior veins of wing weak; small species. NEMOTELUS
   Scutellum with spines. 2

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2. Antennæ short, with a subterminal bristle. , . OXYCERA
   Antennæ more or less elongate, without bristle. . . . 3
3. Scutellum with two spines on its border. 4
   Scutellum with six spines. [Compare Scoliopelta.]
4. Antennæ much elongated, style not differentiated, eyes bare, smaller species. . . . . EUPARHYPHUS
   Antennæ less elongate, style more or less differentiated, eyes pilose, larger species. . . . . CLITELLARIA

PACHYGASTRINÆ.

Small species, abdomen oval. Three posterior veins, all arising from the discal cell. Antennæ situated near the middle of the face in profile, third joint short, with a terminal arista, scutellum without spines. . . . . PACHYGASTER

ALLOGNOSTA Osten Sacken, Berl. Ent. Zeit. XXVII, 297, 1883.
BERIS Latreille, Hist. Nat. des Crust. et des Ins. XIV, 340, 1804.
SCOLIOPELTA Williston, Entom. Amer. I, 119, 1885.
SARGUS, Fabricius, Ent. Syst. Suppl. 566, 1798.
MACROSARGUS Bigot, Ann. Soc. Ent. Fr. [5] IX, 225, 1879.
MICROCHRYSA Loew, Verh. Zool.-Bot. Ver., 1855.
PTECTICUS Loew, Verh. Zool.-Bot. Ver., 1855.
CHRYSONOTUS Loew, Verh. Zool.-Bot. Ver., 1855.
HERMETIA Latreille, Hist. Nat. des Crust. etc. XIV, 338, 1804.
ODONTOMYIA Meigen, Klassific. etc. I, 128, 1804.
MYXOSARGUS Brauer, Denkschr. d. k. k. Akad. d. Wiss. 1882, 21.
STRATIOMYIA Geoffroy, Hist. Nat. Ins. II, 475, 1764.
OXYCERA Meigen, Illiger's Magazine, II, 265, 1803.
EUPARYPHUS Gerstæcker, Linn. Entom. XI, 1857.
CLITELLARIA Meigen, Illiger's Magaz. II, 265, 1803.
NEMOTELUS Geoffroy, Hist. Nat. Ins. II, 542, 1764.
PACHYGASTER Meigen, Illiger's Magaz. II, 266, 1803.

TANYSTOMA.

Tarsi with three membranous pads at the tip (the empodia developed pulvilliform); body and legs wholly without macrochætæ; males holoptic, eyes rarely narrowly separated; two sub-marginal, five posterior cells in the wing,* fifth posterior cell not contiguous

*The genus Agnotomyia with four posterior cells, is the only exception.

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at its base with the discal cell; the marginal vein encompasses the whole wing; some or all the tibiæ with spurs.

Third joint of the antennæ annulate, never with differentiated style or bristle; tegulæ rather large. . . TABANIDÆ
Third joint of antennæ simple, with a simple, or thickened styliform, bristle; tegulæ rudimentary. . . LEPTIDÆ

TABANIDÆ.

Species never very small, often among the largest in the order; never thickly pilose; in life the eyes usually brilliantly colored and marked. Head short, broad, eyes large. Antennæ porrect, the third joint composed of from three to eight annuli or segments. Thorax not very convex, scutellum without spines on its border. Abdomen broad, moderately elongate or short, never slender or constricted. Legs moderately stout, the front and middle tibiæ sometimes dilated, the middle tibiæ always with spurs. Veins of the wings distinct; first posterior cell (and fourth in exotic species) rarely closed.

Early stages passed in the water or earth; larvæ carnivorous, with a distinct head; pupæ free. The females are blood-sucking, usually found in the neighborhood of pastures, in sunny open parts of woods, during the hot sun-shiny days of summer. The males are much more rarely met with, and will be found usually in sweepings of meadow lands, on flowers, etc.

1. Hind tibiæ with spurs at their tips, sometimes small. (Pangoninæ.) 2
   Hind tibiæ without spurs; ocelli absent. (Tabaninæ.) . 5
2. Third joint of the antennæ composed of eight annuli, the first of which is only a little longer than the following ones. . 3
   Third joint composed of five or fewer segments, the first of which is much longer than the following; ocelli present. . 4
3. Front of female narrow, without denuded callus; ocelli rarely absent. . . . . PANGONIA
   Front of female broad, with a large, broad, denuded callus; ocelli present. . . . . APATOLESTES
4. Second joint of the antennæ about half as long as the first; wings hyaline or with small spots; eyes in life with numerous small dots. . . . . SILVIUS

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Second joint as long, or but little shorter than the first; wings with a dark picture; eyes in life with fewer, larger spots. CHRYSOPS

5. Front of the female as broad as long; callus transverse; front tibiæ a little dilated; base of third antennal joint not dilated. HÆMATOPOTA

Front of female narrow. 6

6. Front tibiæ very much dilated; third antennal joint not strongly angulated above. . . . . ° LEPIDOSELAGA

Front tibiæ moderately dilated; face short. . DIACHLORUS

Front tibiæ not dilated. 7

7. A small ocelligerous tubercle present in the female; eyes pubescent, more distinctly in the male. . . THERIOPLECTES

Ocelligerous tubercle absent; eyes pubescent. . ATYLOTUS

Ocelligerous tubercle absent; eyes bare. . . . TABANUS

PANGONIA Latrelle, Hist. Nat. des Crust. et des. Ins. III, 437, 1802.
APATOLESTES Williston, Entom. Amer. I, 12, 1885,
SILVIUS Meigen, System. Beschr. II, 21, 1820.
CHRYSOPS Meigen, in Illiger's Magaz., 1803.
HÆMATOPOTA Meigen; in Illiger's Magaz. 1803.
DIACHLORUS Osten Sacken, Prodr. etc., II, 475, 1876.
THERIOPLECTES Zeller, Isis, 1842.
TABANUS Linne, Fauna Suecica, 1761.
ATYLOTUS Osten Sacken, Prodr. etc. 426, 1876.

LEPTIDÆ.

Rather small to rather large species; thinly pilose, with short thorax, elongate abdomen and large wings. Head short, eyes of male contiguous or approximate; ocelli present. Antennæ mostly short, never elongate, the third joint with a terminal or dorsal bristle, or terminal slender style. Face small, excavated. Proboscis short; palpi slender, porrect, often bushy pilose. Abdomen elongate, broadest toward the base, composed of seven segments; the female ovipositor pointed. Legs slender, the hind pair somewhat elongate; some or all the tibiæ spurred. Posterior cells of wings usually all open.

Larvæ carnivorous, living in earth, decaying wood, dry sand, in moss or in water. The flies are usually found about meadow and

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low woodlands, on bushes, etc., and prey upon other insects. Some western species of Symphoromyia suck blood, as do the horse-flies.

1. Front tibiæ with terminal spurs. 2
   Front tibiæ without spurs. 3
2. Front tibiæ with two spurs; five posterior cells in the wing. TRIPTOTRICHA
   Front tibiæ with one spur; four posterior cells in the wing. AGNOTOMYIA
3. Third joint of antennæ round, oval, or pear-shaped, its bristle distinctly terminal. 4
   Third joint kidney-shaped, the arista more dorsal, . . . 6
4. Anal cell open; hind tibiæ with two spurs. . . LEPTIS
   Anal cell closed. 5
5. Third joint of antennæ with a slender arcuate bristle; hind tibiæ with one spur. . . . . CHRYSOPILA
   Third joint with a shorter, slender style. . SPANIA, PTIOLINA
6. Hind tibiæ with two spurs; anal cell closed. . . ATHERIX
   Hind tibiæ with one spur; anal cell open. . SYMPHOROMYIA

ARTHROPEAS Lœw, Stett. Ent. Zeit. 1850.
ARTHROCERAS Williston, Entom. Amer. II, 107, 1886.
GLUTOPS Burgess, Proc. Boston Soc. Nat. Hist. 1878, 320.
TRIPTOTRICHA Lœw, Centur, X. 15, 1874.
AGNOTOMYIA Williston, Entom. Amer. II, 106, 1886.
CHRYSOPILA Macquart, Dipt. du nord de la France, 1827.
LEPTIS Fabricius, Syst. Antl. 69, 1805.
SPANIA Meigen, Syst. Beschr. VI, 335, 1830.
PTIOLINA Zetterstedt, Dipt. Scand. I, 226, 1843.
ATHERIX Meigen, Illiger's Magaz. II, 271, 1803.
SYMPHOROMYIA Frauenfeld, Verh. Zool. Bot. Gesellsch. 491, 1867.

ASILIDÆ.

Species of moderate to large size; bristly; predaceous. Head flattened, the eyes prominent. Front concave between the eyes, the eyes not contiguous in either sex. Ocelli present. Antennæ porrect, with or without a terminal bristle or style; when with a terminal style, the antennæ apparently four or five-jointed. Proboscis pro-

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jecting, never elongate, without terminal fleshy labella, adapted for piercing. Abdomen with eight segments, the hypopygium or oviduct usually prominent. Legs strong, moderately long; empodia bristly, not pulvilliform, the pulvilli sometimes rudimentary. Basal cells of the wing long; five posterior cells, two or three submarginal cells; anal cell open or closed in the margin.

The flies are usually observed in sunny open paths, or upon leaves of underbrush, on the alert for other insects, which they seize upon the wing and pierce with their stout proboscis.

1. Marginal cell of the wing open. (Dasypogoninæ.) . 2
   Marginal cell closed. 33
2. Front tibiæ with a terminal claw-like spur. . . . 28
   Front tibiæ without terminal claw-like spur. 3
3. Pulvilli rudimentary or wanting. 4
   Pulvilli normal. 5
4. Face very narrow; abdomen very long, slender, narrow on proximal part; hind legs elongate, slender. . LEPTOGASTER
   Face moderately narrow; abdomen not unusually long, broader at base; hind legs not elongate. . . . ABLAUTATUS
5. Head narrow, about as high as broad; face narrow above, broader and swollen below, in large part covered with hair. Large, elongate species. 6
   Head very obviously broader than high. 8
6. Antennæ with a terminal style. 7
   Third joint of antennæ very long, without style; fourth posterior cell closed before the border of the wing. Black species with or without red on the abdomen. . . . OSPRIOCERUS
7. First posterior cell open, not closed before the border of the wing. . . . . STENOPOGON
   First and fourth posterior cells closed before the border of the wing; third joint of antennæ shorter, style longer. SCLEROPOGON
8. Fourth posterior cell closed before the border. . . . 9
   Fourth posterior cell wide open, rarely nearly closed. . 13
9. Antennæ elongate, of five joints (Myelaphus). . . 14
   Antennæ not elongate, of three joints, and a terminal style. 10
10. Face bare, except on oral margin; abdomen elongate, cylindroidal; anterior intercalary vein continuous, or nearly so, with

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the fourth vein, the last section of fourth vein oblique, sinuous, closing or much narrowing the broad first posterior cell. Large, or very large species. . . . MICROSTYLUM
Face pilose or hairy, more convex. 11

11. Abdomen cylindrical, not narrow at the tip, elongate; near the base of second and third segments with white pollinose emarginate cross-bands; wings dark. . . . DIZONIAS
Abdomen less elongate, with five or six white pollinose cross-bands. 12

12. First posterior cell open, scarcely narrowed, face broad. LAPHYSTIA
First posterior cell much narrowed or closed. . . TRICLIS

13. Antennæ elongate, composed of five joints; nearly bare species. 14
Antennæ less elongate or short, of three joints, with or without a short or slender style. 15

14. First and second joints of antennæ of nearly equal length, third elongate, fourth short, fifth elongate and densely pubescent; third and fourth not lobed at tip . . . CERATURGUS
First joint about three times as long as the second, third elongate, fourth and fifth of nearly equal length, third and fourth at the tip with two lobes or processes, reaching to about the middle of the following joint. . . . MYELAPHUS

15. Style of antennæ short, thick, obtuse, not easily distinguishable from the third joint, or, if so, forming apparent joints; antennæ more or less elongate. 16
Terminal style small, more slender than the joint, apparent; antennæ shorter. 18

16. Nearly bare species; face flattened, bare except below. Small, or rather small, species, shining or metallic black, with narrow or cylindrical abdomen and large wings. . . 17
Thickly pilose species, the bristles few and hair-like; antennæ situated upon a convexity, thence receding to the facial tubercle, which is situated upon the lower part of the face; abdomen short; head narrow. . . . . DICOLONUS

17. All the tibiæ and the hind femora with short, strong setæ. ECTHODOPA
Hind femora without such setæ. . . . . DIOCTRIA

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18. Face distinctly convex in profile, swollen or gibbose.* . 19
Face flattened or gently convex. 20

19. Thickly pilose species; the gibbosity of the face reaches to the base of the antennæ; anal cell usually open.* CYRTOPOGON
Thinly pilose, more pollinose species, the convexity of the face on the lower part, anal cell usually closed. . DAULOPOGON

20. Abdomen elongate; front broad anteriorly, narrow behind. PLESIOMMA
Front not narrowed behind. 21

21. Hind tibiæ toward the tip, and their metatarsi, much thickened. 22
Hind tibiæ not, or but slightly, thickened toward the tip; metatarsi not thickened. 23

22. Head much broader than high, transverse, "goggle"-like; abdomen short, wings large. . . . . HOLCOCEPHALA
Head only moderately broader than high, not at all spectacle-like in appearance. . . . . HOLOPOGON

23. Abdomen with thick recumbent pile above; thickly pilose species; antennæ slender. . . . . PYCNOPOGON
Abdomen without such pile above. 24

24. Slender, nearly bare species; face perpendicular, straight or gently concave, narrowed above, bare, except on oral margin. 25
Face gently rounded, not prominent below, in large part hairy, not or but slightly narrowed above. 26

25. Thickly whitish pollinose; abdomen flattened, usually reflected upward, third joint of antennæ and style both slender. STICHOPOGON
Less thickly pollinose; abdomen cylindrical, a little broader at base; third joint of antennæ short, broad, style minute. See Habropogon bilineatus Will.

26 Large, elongate species, style of antennæ short . CALLINICUS
Moderately large, not much elongate. 27

27. Abdomen broader at the base, depressed; thorax much convex above, antennæ slender, style long and slender (compare species of Cyrtopogon). . . . . ANISOPOGON

* Several species are placed provisionally under Cyrtopogon in which the facial gibbosity is small, and the body thinly pilose. They may be distinguished by the abdomen not being broad, and having white pollinose cross-bands; in some the wings have small but distinct clouds on the cross-veins.

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Abdomen short, cylindrical. Black, with bright golden opaque pollinose markings on thorax and abdomen. See "Laparus" pictitarsis Bigot.

28. Large species; face bare with bristles on the oral margin, in profile straight or concave, the oral margin projecting. 29
Smaller species, face convex on lower portion, not projecting. 30

29. Elongate; fourth posterior cell closed, usually a considerable distance before the margin. . . . . DEROMYIA
Less elongate; fourth cell open or closed in the margin, rarely a little petiolate. . . . . SAROPOGON

30 Head broad and flat, face not gibbose, third joint of antennæ slender, elongate. 31
Head only moderately broader than high; face gibbose below; third joint of antennæ more or less dilated, style very short; thorax and legs with numerous bristles; abdomen broadest at the base, rather slender, subcylindrical . . LESTOMYIA

31. Abdomen finely punctulate, of nearly equal width; hind tibiæ at the tip and their tarsi only a little thickened; wings hyaline. TARACTICUS
Abdomen smooth; hind tibiæ at the tip and their tarsi thickened (compare here Nicocles? scitula); antennal style slender, acuminate; wings variegated. 32

32. Abdomen flattened; in the female a little broader beyond the middle; in the male near the tip, the last two segments of which conspicuously silvery above. . . . NICOCLES
Abdomen of nearly equal width throughout, the last segment in the male not silvery, fourth posterior cell narrowed. BLACODES

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33. Antennæ without a terminal bristle (Laphrinæ). . . 34
Antennæ with a terminal bristle (Asilinæ). . . . 41

34. The veins at the distal ends of the discal and fourth posterior cells in the same straight line, continuous, or nearly so. 35
The veins, etc., not in the same straight line, the vein closing the fourth posterior cell more or less remote and oblique. 36

35. First joint of antennæ elongate, slender; second posterior cell narrowed toward the margin of the wing. . CEROTAINIA
First joint of the antennæ much shorter than the third; first posterior cell narrowed or closed, the second wide open. ATOMOSIA

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36. First posterior cell narrowed or closed. 37
First posterior cell wide open. 39

37. Three submarginal cells, i. e. the upper branch of the third vein is connected with the second by a short vein. POGONOSOMA
Two submarginal cells. 38

38. Hind femora of nearly equal thickness throughout; antennæ with a distinct terminal style; very large, robust, thickly pilose species. . . . . HYPERECHIA
Hind femora thickened toward the end; antennæ without terminal style; more elongate, less pilose species. ANDRENOSOMA

39. Thorax and abdomen nearly or quite bare; hind femora with spinous tubercles below. . . . . LAMPRIA
Thorax and abdomen pilose, larger species. . . . 40

40. Densely pilose species; the abdomen short, broad, usually broader beyond the middle, in the male sometimes more elongate; proboscis thick. . . . . DASYLLIS
Less pilose, more elongate species; proboscis more elongate and slender. . . . . LAPHRIA

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41. Bristle of antennæ plumose. . . . . OMMATIUS
Bristle not plumose. 42

42. The third vein (posterior branch) curved forwards to meet the costa; two submarginal cells, rarely three. . . . 43
The third vein curved backward to meet the margin of the wing at or beyond the tip. 44

43. Oviduct cylindrical, with a terminal circlet of spines. PROCTACANTHUS
Oviduct laterally flattened, without circlet or spines. . ERAX

44. Two submarginal cells.* (Asilus sens. lat.) . . . 46
Three submarginal cells. 45

45. Abdomen shorter than the wings; body thickly pilose, claws obtuse. . . . . MALLOPHORA
Abdomen longer than the wings; body thinly pilose. PROMACHUS

46. Oviduct (♀) laterally compressed. 47
Oviduct not laterally compressed, conical. 62

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* The remainder of this table is a translation from Loew, Diptf. Sud. Afrikas, p. 142.

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47. Face without gibbosity. 48
Face with gibbosity; if restricted to the lower part, and hence not conspicuous, face neither carinate nor unusually narrowed. 52

48. Face narrow throughout, not at all carinate, the mystax composed of few long hairs. . . . . ° STENOPROSOPIS
Face of unusual width, obtusely carinate; mystax composed of numerous hairs and bristles. 49

49. The closed fourth posterior cell much widened at the expense of the discal cell which is narrowed in its middle. ° SYNOLCUS
Fourth posterior cell not unusually broader towards its base. 50

50. Mystax moderately thick, bristly, not wall-like. ° DYSCLYTUS
Mystax fine-haired, long and thick, wall-like. . . . 51

51. Second posterior cell widened near the base in front at the expense of the first posterior cell. . . ° LOPHONOTUS
Second posterior cell not widened in front at the base. ° TRICHONOTUS

52. Dorsum of thorax with bristles reaching to the front part, or at least thickly hairy along the middle. 53
Vestiture of the front half of the thorax short. . . . 55

53. Facial gibbosity slight, reaching nearly to the antennæ. ° DASOPHRYS
Facial gibbosity very distinctly prominent, reaching much less high. 54

54. Third joint of the antennæ slender, linear. ° PROTOPHANES
Third joint of the usual elongate elliptical shape. ° DYSMACHUS

55. End lamellæ of the oviduct (♀) egg-shaped and wedged in. EUTOLMUS
End lamellæ wholly free, nearly style-like. . . . 56

56. Posterior border of the last ventral segment in the male more or less widened. . . . . MACHIMUS
Posterior border not widened (♂). 57

57. Legs prevailing shining yellow. . . NEOMOCHTHERUS
Legs prevailing black, or light and opaque colored. . . 58

58. Abdomen shining black above and below. . STILPNOGASTER
Abdomen not shining on both sides. 59

59. General color yellowish-gray or ash-gray, the legs with reddish yellow stripes or bands; opaque. . . ° EPITRIPTUS

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General color more or less black-gray, the legs prevailing black, the tibiæ often red. 60

60. The male genitalia very thickly club-like, or at least the sixth and seventh abdominal segments help form the female oviduct. . . . . NEOITAMUS

Male genitalia not club-like, the sixth and seventh segments take no part in the formation of the oviduct. . . 61

61. Male genitalia, when seen from above, more or less acute on the end; facial gibbosity rather large. . . . TOLMERUS.

Male genitalia, when seen from above, more or less obtuse; facial gibbosity very small. . . . . ° CERDISTUS

62. Abdomen without bristles before the incisures. . . 63

Abdomen with bristles before the incisures. . . . 68

63. Facial gibbosity extraordinarily large, the extremely sharp tip of the proboscis bent somewhat upwards. ° PROAGONISTES

Facial gibbosity of usual size, the proboscis wholly straight, and not sharper than usual. 64

64. Mystax bristly as usual. 65

Mystax fine-haired, depressed. . . . ° ANTIPHRISSON

65. Abdomen fine-haired, depressed. 66

Abdomen with rather long, scattered vestiture. ° PAMPONERUS

66. Bright colored, large species. 67

Small, ash-gray species. . . . . ° RHADIURGUS

67. Feet of usual length and structure. . . . . ASILUS

Feet unusually elongated. . . . . ° ECCOPTOPUS

68. First joint of the four anterior tarsi remarkably short. ° ECHTHISTUS

First joint, etc., not remarkably shortened. . . . 69

69. Oviduct (♀) club-shaped, thickly pilose below. ° ANTIPALUS

Oviduct conical, beset with short spines at the end. PHILODICUS

LEPTOGASTER Meigen, Illiger's Magaz. 1803.
CERATURGUS Wiedemann, Analecta, 12, 1824.
DIOCTRIA Meigen, Illiger's Magaz. 1803.
ECHTHODOPA Loew, Centur. VII, 27, 1866.
PLESIOMMA Macquart, Dipt. Exot. I, 2, 54, 1838.
MICROSTYLUM Macquart, Dipt. Exot. I, 2, 26, 1838.
OSPRIOCERUS Loew, Centur. VII, 51, 1866.
ABLAUTATUS Loew, Berl. Ent. Z. 1874, 377.

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Stenopogon Loew, Linn. Entom. II, 453, 1847.
Scleropogon Loew, Centur. VII, 45, 1886.
Sphageus Loew, Centur. VII, 55, 1866.
Dicolonus Loew, Centur. VII, 56, 1866.
Archilestris Loew, Berl. Ent. Z. 1874, 377; Archilestes Schiner, Verh. Z. B. Ges. 1866, 672.
Dizonias Loew, Centur. VII, 53, 1866.
Callinicus Loew, Centur. X, 32, 1872.
Anisopogon Loew, Berl. Ent. Z. 1874, 377; (Heteropogon Loew).
Cyrtopogon Loew, Linn. Ent. II, 516, 1847.
Pycnopogon Loew, Linn. Ent. II, 526, 1847.
Holopogon Loew, Linn, Ent. II, 473, 1847.
Daulopogon Loew, Berl. Ent. Z. 1874, 377; (Lasiopogon Loew).
Psilocurus Loew, Berl. Ent. Z. 1874, 373.
Stichopogon Loew, Linn. Ent. II, 500, 1847.
Holcocephala Jænnicke, Neue Exot. Dipt. 51, 1867.
Nicocles Jænnicke, Neue Exot. Dipt. 47, 1867.
Lestomyia Williston, Trans. Amer. Ent. Soc. XL, 19, 1883; Clavator Osten Sacken.
Blacodes Loew, Berl. Ent. Z. 1874, 377.
Taracticus Loew, Centur. Vol. II, 240, 1872.
Deromyia Philippi, Verh. Z. B. Ges. 1865 (Diogmites Loew).
Sarapogon Loew, Linn. Ent. II, 439, 1847.
Lastaurus Loew, Bem. ueber d. Fam. d. Asiliden, 17, 1851.

Atomosia Macquart, Dipt. Exot. I, 2, 73, 1838.
Cerotainia Schiner, Verh. Zool. Bot. Ges. 1866, 673.
Dasyllis Loew, Bem. ueber die Fam. der Asiliden, 20, 1851.
Hyperechia Schiner, Verh. Zool. Bot. Gesellsch. XVI, 673, 1866.
Pogonosoma Rondani, Dipt. It. Prodr. I, 160, 1856.
Laphria Meigen, in Illiger's Magaz. II, 1803.
Lampria Macquart, Dipt. Exot. I, 2, 60, 1838.
Laphystia Loew, Linn, Ent. II, 538, 1847.
Andrenosoma Rondani, Dipt. It. Prodr. I, 160, 1856.

Mallophora Macquart, Hist. Nat. Dipt, I, 300, 1834.
Promachus Loew, Linn. Ent. III, 390, 1848.
Erax Macquart, Dipt. Exot. I, 2, 107, 1838.
Proctacanthus Macquart, Dipt. Exot. I, 2, 120, 1838.
Asilus Linne, Fauna Suecica, 1761.

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PHILONICUS Loew, Linn. Ent. IV, 144, 1849.
LOPHONOTUS Macquart, Dipt. Exot. I, 2, 125, 1838.
NEOMOCHTHERUS Osten Sacken, Cat. Dipt. for Mochtherus Loew, Linn. Ent. IV, 58, 1849.
NEOITAMUS Osten Sacken, Cat. Dipt. for Itamus Loew, Linn. Ent. IV, 84, 1849.
MACHIMUS Loew, Linn. Ent. IV, 1, 1849.
STILPNOGASTER Loew, Linn. Ent. IV, 94, 1849.
TOLMERUS Loew, Linn. Ent. IV, 64, 1849.
OMMATIUS Wiedemann, Dipt. Exot. I, 213, 1821.

APIOCERIDÆ.

Moderate to rather large, elongate, bristly, thinly pilose, predaceous flies. Head somewhat flattened, narrower than the thorax; front not excavated between the eyes, the eyes not contiguous in the male. Ocelli present. Antennæ porrect, not short, the third joint with a short terminal style. Face very short. Proboscis porrect, moderately elongate, with flattened, more or less fleshy labella. Abdomen elongate; hypopygium disengaged; more or less enlarged; oviduct with a terminal circlet of spines. Legs bristly; empodia not pulvilliform. Basal cells of wings elongate; third longitudinal vein furcate or simple (genus novum, Australia); five posterior cells; the third and fourth longitudinal veins both curve forward to terminate before the tip of the wing. . . . . APIOCERA

APIOCERA Westwood, London and Edinburgh Phil. Magaz. 1835; Pomacera Macquart; Anypenus Philippi.

NEMISTRINIDÆ.

Species of moderate size, thinly or thickly pilose. Neuration complicated; the basal cells elongate. Antennæ small, short; third joint simple, with a terminal, slender, jointed style. Ovipositor of the female elongate, often slender. Tibiæ without spurs; empodia developed pulvilliform, but, with the pulvilli, often minute.

But four species of this small family are known from the United States, and they will be readily recognized by the accompanying cut of the wing of Rhynchocephalus volaticus Will. The habits of the larvæ of this family are known in but one species,

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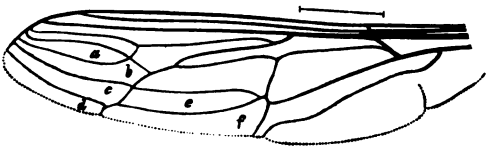
Hirmoneura obscura of Europe, where they are parasitic upon beetles.



Wing of Rhynchocephalus volaticus Will.—a, second submarginal, b, c, d, e, f, first—fifth posterior cells.

Proboscis short, protruding but little from the oral opening. Eyes bare (often pilose in exotic species). Two or three submarginal cells. . . . . HIRMONEURA

Proboscis long, directed backwards. Antennæ broadly separated. Eyes bare. Ovipositor of the female composed of two slender diverging lamellæ. Three submarginal cells.
RHYNCHOCEPHALUS

HIRMONEURA Meigen, Syst. Beschr. II, 132, 1820.

RHYNCHOCEPHALUS Fischer, Mem. de la Soc. imp. d. natur. de Moscou, I, 217, 1806.

MIDASIDÆ.

Rather larger to very large, thinly clothed or bare, elongate flies. Neuration complicated; the basal cells long; the fourth longitudinal vein always terminating at or before the tip of the wing. Antennæ elongate, the third joint flattened, and composed of several distinct segments. Ocelli wanting. Proboscis with fleshy labella. Empodia very little developed, not pulvilliform.

Larvæ found in decaying wood, etc., probably carnivorous.

1. Terminal segment of the female abdomen with a circlet of spines. 2
   Terminal segment without circlet of spines. . . . MIDAS

2. A small cross-vein runs into the hind margin of the wing between the anal cell and the tip; hind tibiæ of female with spurs.
   ECTYPHUS
   No such small cross-vein; hind tibiæ (♀) without spurs.
   LEPTOMIDAS

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"Generis Ectyphi proximum, differt: antennis elongatis, segmento penultimo cylindrico, ultimo, ♂, circiter duplo longiore, compresso, basi parum dilatato, apice obtuse acuminate ♀, duplo breviore, obtusiore, abdominis segmento ultimo inermi, cyathiformi, utrinque, parum dilatato. (Long. 20mm. undique niger, abdomine nitente, alis violaceo micantibus, extremo apice albidis.—P. phyllocerus, Rocky Mts.) . . . . . PHYLLOMIDAS."

MIDAS Fabricius, Entom. Syst. IV, 252, 1794.
LEPTOMIDAS Gerstæcker, Stett. Ent. Z. 1868, 81.
ECTYPHUS Gerstæcker, Stett. Ent. Z. 1868, 92.
PHYLLOMIDAS Bigot, Bullet. Soc. Ent. Fr. 1879, 62.

BOMBYLIDÆ.*

Medium to small-sized flies; often with abundant, long, delicate pile. Antennæ usually short, composed of three joints, the third simple, with or without a terminal style. Ocelli present; eyes in the male separated or contiguous. Proboscis usually projecting from the oral cavity and slender; sometimes short, with broad labella. Legs moderately long, weak, with short bristles or spines; empodia rudimentary; pulvilli sometimes rudimentary. Wings often with dark markings; two or more submarginal, three or four posterior, cells present; anal cell closed in or near the border, or narrowly open.

Flower flies, found in the bright sunshine hovering over blossoms, or resting on sunny paths, sticks or stones, rarely on leaves. Larvæ, so far as known, parasitic upon hymenoptera and orthoptera; pupæ free.

1. The bifurcation of the second and third veins takes place opposite, or nearly opposite, the small cross-vein; the second vein forms a knee at its origin from the præfurca; the third vein in a straight line with the præfurca. 3
   The bifurcation of the second and third veins takes place some distance before the small cross-vein, at an acute angle; the second vein does not form a knee at its origin from the præfurca. 10
2. Three or more submarginal cells. 3
   Two submarginal cells. 7

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* Table reproduced from Osten Sacken, Biologia Centrali-Americana, Diptera, p. 75, 1886.

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3. Four, sometimes five, submarginal cells. . HYPERALONIA
Three submarginal cells. 4

4. Third joint of the antennæ elongate-conical. 5
Third joint of the antennæ short, onion-shaped, with a very long style, not bisected by a suture. 6

5 The conical third joint bears a more or less long style, separated by a distinct suture. . . . . EXOPROSOPA
The conical third joint does not bear an elongate style at the end; second vein strongly contorted, in the shape of a recumbent S. . . . . DIPALTA

6. Proboscis long, projecting far beyond the oral margin. STONYX
Proboscis withdrawn within the oral cavity; rudimentary pulvilli. . . . . ISOPENTHES

7. The style of the third antennal joint distinctly bisected by a suture, and bearing a pencil of hairs at the tip.
ARGYRAMŒBA
The antennal style not bisected, and with a microscopic bristle, but no pencil of hairs, at the tip. 8

8. Eyes of the male contiguous on the vertex; anal cell closed.
ASTROPHANES
Eyes of the male not contiguous on vertex; anal cell open. 9

9. The contact of the discal cell with the third posterior not much longer than its contact with the fourth posterior cell; proboscis long, projecting far beyond the oral margin; sides of the abdomen with a fringe of scales, and not of hairs only.
LEPIDANTHRAX
The contact of the discal cell with the third posterior at least twice as long as its contact with the fourth posterior cell, the latter contact often merely punctiform. . ANTHRAX

10. Body Anthrax-like; frontal triangle in the male large; frontal space in the female of a corresponding size. . . . 11
Body not Anthrax-like; frontal triangle in the male small. 13

11. Antennæ approximate at the base; third antennal joint gradually attenuate. . . . . OCODOCERA
Antennæ remote at base. 12

12. Pulvilli distinct. . . . . APHŒBANTUS
Pulvilli none. . . . . EPACMUS

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13. Body (antennæ, thorax, abdomen) clothed with more scales than hairs, gibbose, the abdomen hanging down; antennæ long, first joint unusually long. 14
Body clothed with hairs, or else nearly glabrous. . . 15

14. Four posterior cells. . . . . LEPIDOPHORA
Three posterior cells. . . . . TOXOPHORA

15. Four posterior cells. 16
Three posterior cells; anal cell closed. 26

16. First posterior cell closed. 17
First posterior cell open. 21

17. Two submarginal cells. 18
Three submarginal cells. . . . . PANTARBES

18. First basal cell longer than the second. 19
Both basal cells of equal length. 20

19. Head comparatively small; the emargination of the occipital orbit almost imperceptible; contact between the second submarginal cell and the first posterior more than punctiform. BOMBYLIUS
Head comparatively large; the emargination of the occipital orbit distinct; contact between the second submarginal cell and the first posterior cell often only punctiform. COMASTES

20. Underside of the head moderately pilose, and hence its different parts (including the base of the antennæ, the oral edge, etc.) easily perceptible. . . . . SYSTŒCHUS
Underside of the head densely pilose, the root of the antennæ, epistoma, mouth, etc., being completely hidden. ANASTŒCHUS

21. Two submarginal cells. 22
Three submarginal cells. 25

22. Both basal cells of equal length. . . . SPARNOPOLIUS
First basal cell longer than the second. 23

23. Third antennal joint not truncate at the tip. ECLIMUS, EPIBATES
Third antennal joint flattened, truncate at the tip. . . 24

24. Proboscis short. . . . . PARACOSMUS
Proboscis very long. . . . . PHTHIRIA

25. The rather narrow marginal cell very much expanded at the end. LORDOTUS
The marginal cell only moderately expanded. . . . PLOAS

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26. Proboscis much longer than the antennæ; small, Bombylius-like, pubescent insects. . . . . GERON

Proboscis shorter than the antennæ; long Ammophila-like, almost glabrous insects; four basal segments of the abdomen very narrow. . . . . SYSTROPUS

"♀ Gen. Geronis (auctor.) vel Dasypalpi (Macq. Dipt. Exot.) satis vicinum, præcipue differt antennarum palporumque conformatione.

"Corpore angustato, dorso thoracis gibboso, breviter et parce villosulo; capite fere sphærico, thorace angustiore; antennis basi anguste approximatis, fronte lata, parum prominula, genis, suborbitis, angustissimis; proboscide rigido, porrecto, labris invisis antennas longitudine superante; palpis haustello subæque longis, gracilibus, porrectis, rigidis, fere cylindricis, segmento ultimo, villosulo; antennarum, capite longiorum, segmentis duo basalibus abbreviatis, gracilibus, æquilongis, 3°, præcedentibus, simul sumptis, duplo longiore, oblongo, basi leniter dilatato, compresso, apice obtuso, superne villosulo, ad apicem leniter sulciolato, chæto inviso; alis, abdomine multo longioribus, cellulis posticis tribus, tribusque submarginalibus munitis, cunctis late apertis, anali ante marginem clausa, basali externa interna parum longiore, vena quarta longitudinali (Rondani) bifurcata, vena transversali externa, ante medium cellelæ discoidalis satis elongata, locata." RHADOPSELAPHUS

"Same as ANTHRAX except that the axillary cell is not longer than twice the distance between the tips of the last two veins, and the third basal cell is wider at its apex than at any other part. Wings tapering considerably toward the bases, axillary cell very narrow." . . . . . MANCIA

"Antennæ porrect, third joint when viewed from the side scarcely longer than wide, somewhat oval in outline, but tapering to the tip, which is blunt and bears a very short style, tipped with a short bristle; first joint longer than the second, but not one half so long as the third; first two joints of nearly an equal width, not more than one half as wide as the third at its base. Face retreating below, bare except on oral margin. Head a little thicker than long, wider than the thorax, and fully three-fourths as large. Thorax with bristles in front of wings and on hind angles. Scutellum rounded behind. Wings with two submarginal and four posterior cells, all of the latter open, as is also the third basal; small cross-vein near middle of discal cell; furcation of second and third veins occurs before proximal end of discal cell. All of the tibiæ provided with bristles; pulvilli pad-like." . . . . . EUCESSIA

EXOPROSOPA Macquart, Dipt. Exot. II, 1, 35, 1840; Trinaria Mulsant.

HYBERALONIA Rondani, Archivio per la Zool. III, 1864.

STONYX Osten Sacken, Biologia Centrali Americana, Diptera, 94, 1886.

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ISOPENTHES Osten Sacken, Biologia Centrali-Americana, Diptera, 96, 1886.
DIPALTA Osten Sacken, Western Dipt. 236, 1877.
ARGYRAMŒBA Schiner, Weiner Ent. Monatschr. IV, 51, 1860.
ASTROPHANES Osten Sacken, Biologia Centrali-Americana, Diptera, 106, 1886.
LEPIDANTHRAX Osten Sacken, Biologia Centrali-Americana, Diptera, 107, 1886.
ANTHRAX Scopoli, Ent. Carn. 1763.
ONCODOCERA Macquart, Dipt. Exot. II, 83, 1840.
EPACMUS Osten Sacken, Biologia Centrali-Americana, Diptera, 142, 1886; Leptochilus Loew, preoccupied.
APHŒBANTUS Loew, Centur. X, 39, 1872.
BOMBYLIUS Linne, Fauna Suecica, 1758.
COMASTES Osten Sacken, Western Dipt. 256, 1877.
SYSTŒCHUS Loew, Neue Beitr. III, 34, 1855.
ANASTŒCHUS Osten Sacken, Western Dipt. 251, 1877.
PANTARBES Osten Sacken, Western Dipt. 254, 1877.
SPARNOPOLIUS Loew, Neue Beitr. III, 43, 1855.
LORDOTUS Loew, Centur. V, 53, 1863.
PARACOSMUS Osten Sacken, Western Dipt. 262, 1877.
PHTHIRIA Meigen, Illiger's Magaz. 1803.
GERON Meigen, Syst. Beschr. II, 223, 1820.
SYSTROPUS Wiedemann, Nov. Dipt. 1820.
LEPIDOPHORA Westwood, Lond. and Edinb. Phil. Magaz. 1835.
TOPHORA Meigen, Illiger's Magaz. II, 270, 1803.
ECLIMUS Loew, Stett. Ent. Zeit, 1844, 154.
RHABDOSELAPHUS Bigot, Bullet. Soc. Ent. Fr. 1886, p. CIII.
MANCIA Coquillett, Can. Entom. 1886, 159.
EUCESSIA Coquillett, Can. Entom. May, 1886.

THEREVIDÆ.

Rather small, elongate, bristly, predaceous flies. Eyes of the male contiguous; front in the female not excavated. Antennæ composed of three joints, the third simple, with a terminal style, sometimes wanting. Proboscis moderately projecting, the labella broad. Ocelli present. Abdomen elongate; genitalia (♂, ♀) moderately or but little prominent. Legs slender, bristly; empodia wanting. Third longitudinal vein of the wings furcate, the posterior

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branch terminating beyond the tip; five posterior cells; basal cells long, the third (anal) closed in the border.

Predaceous flies, concealing themselves among the leaves of low bushes where they lie in wait for other insects. Larvæ long, snake-like, apparently composed of nineteen segments; those of the known species found in fungi or decaying wood; pupæ free.

1. Antennæ situated upon a frontal projection, the first joint elongate and more or less thickened, longer than the head. XESTOMYZA

   Front not projecting; first joint of the antennæ usually slender, when thickened, never longer than the head. . . 2

2. Face thickly pilose. . . . . THEREVA

   Face bare. . . . . PSILOCEPHALA

XESTOMYZA Wiedemann, Nova Dipt. Gener 1820.
THEREVA Latreille, Precis, etc. 1796.
PSILOCEPHALA Zetterstedt, Ins. Lapp. 525, 1840.

SCENOPINIDÆ.

Small, slender, bare flies. Males usually holoptic; the front in neither sex excavated. Ocelli present. Antennæ composed of three simple joints, without style or bristle, the third joint elongate. Proboscis short, concealed. Legs rather short; empodia wanting. Third longitudinal vein furcate; three posterior cells, the first narrowed or closed in the margin; basal cells elongate, the first much longer than the second, anal cell closed before the margin.

Flies not rare in dwellings on windows. Larvæ similar to those of the Therevidæ; carnivorous, living in decaying wood, under carpets, etc. . . . . SCENOPINUS

SCENOPINUS Latreille, Hist. Nat. d. Ins. et Crust. XIV, 392, 1803.

ACROCERIDÆ.

Small to large, never elongate, pilose or bare species. Head small, or very small; thorax large, spherical; scutellum large; abdomen closely united to thorax, large and inflated. Antennæ two or three jointed, with or without a terminal bristle or style, inserted high up or low down. Eyes very large, contiguous in both sexes. Two, three, or no ocelli present. Proboscis rudimentary or very long. Legs rather stout; empodia developed pulvilliform. Tegulæ very

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large, inflated. Neuration variable, the veins sometimes indistinct.

The flies belonging here will be readily recognized by the hunch-back-like shape, very small head and large tegulæ. They are not very common, found in sweepings, etc. Larvæ, so far as known, parasitic upon spiders or their cocoons.

1. Antennæ with a terminal bristle. 2
   Antennæ without terminal style or bristle. 5
2. Antennæ inserted near the vertex. 7 8
   Antennæ inserted near the mouth. 3 4
3. Wings with a stout costal spur near the tip of auxiliary vein. PTERODONTIA
   Wings without such spur; anal cell absent. Oncodes ~~ACROCERA~~
4. Venation complete; eyes pilose. . . . . OPSEBIUS
   Veins more or less obsolete; eyes bare. Acrocera. ~~OCNÆA~~
5. Proboscis rudimentary. . . . . Oncodes. ~~ONCODES~~
   Proboscis elongate. 6
6. Ocelli wanting; large flies. . . . . LASIA
   Ocelli present; smaller flies. . . . . EULONCHUS

ACROCERA Meigen, Illiger's Magaz. 1803.
OPSEBIUS Costa, Rend. di Soc. R. Borbon. Acad. d. Sc. V, 1856.
PIALOIDEA Westwood, Trans. Ent. Soc. Lond. 1876, 514.
OCNÆA Erichson, Entomogr. 1846.
PTERODONTIA Gray, Griffith's Anim. Kingd. 1832.
EULONCHUS Gerstæcker, Stett. Ent. Zeit. 1856.
LASIA Wiedemann, Analecta, 1824.
ONCODES Latreille, Precis, etc. 154, 1796.

LONCHOPTERIDÆ.

Small (2-4 mm.) slender, brownish or yellowish flies. Antennæ short, porrect, third joint simple, circular, with a terminal bristle. Ocelli present. Scutellum with two bristles. Legs long, short bristly; pulvilli very small; empodia wanting. Wings lancet-like, pointed; three basal cells of moderate size, of nearly equal length; fourth longitudinal vein furcate, and united with the fifth near the base. . . . . LONCHOPTERA

The flies are met, often in abundance, in the grass or on the stones near the margins of shady brooks. The larvæ are but little known.

LONCHOPTERA Meigen, Illiger's Magaz. II, 272, 1803.

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EMPIDÆ.

Rather small to very small, elongate, usually nearly bare, predaceous flies. Head small, usually round, attached by a free neck. Antennæ porrect; first two joints often very small; third joint variable in shape, simple, not annulate, with or without a terminal arista or style, or dorsal arista. Front not excavated. Eyes of male usually contiguous. Ocelli present. Proboscis short or elongate, adapted for piercing; porrect, vertical, or directed backward. Tegulæ small. Abdomen in the female pointed, in the male with more or less prominent genitalia. Legs very variable in structure, the coxæ and femora often in part thickened, elongate, or with various structural peculiarities, usually sexual; empodia not developed pulvilliform. Wings variable in neuration; the discal cell often wanting, as also the anal cell; one to three submarginal cells present.

The flies in their habits are very much like the Asilidæ; they are often observed in swarms about brooks. The larvæ live in decaying vegetable matter. Pupæ free.

1. Anal cell present. 2
   Anal cell wanting; or if present, very small and the sixth vein obsolete (Tachydrominæ). 16
2. Front femora shorter or but little longer than the coxæ (Tachydrominæ). 16
   Front femora longer than the coxæ. 3
3. Posterior basal transverse vein parallel with the hind border of the wing (Empinæ). 9
   Posterior basal transverse vein not parallel with the hind border of the wing (Hybotinæ). 4
4. Third longitudinal vein furcate; first submarginal cell closed. Blepharoproctus
   Third vein simple, not furcate. 5
5. Anal cell shorter than the second basal cell. 8
   Anal cell as long or longer than the second basal. . . 6
6. Origin of the second longitudinal vein nearer the humeral than to the anterior cross-vein; wings usually spotted. Syneches
   Origin not nearer the humeral cross-vein; wings not spotted. 7
7. Vein between the first and second basal cells indistinct. Syndyas
   Vein between first and second basal cells distinct. . Hybos

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8. Third antennal joint conical; bristle terminal. LEPTOPEZA
Third antennal joint ovate; bristle sub-dorsal. OCYDROMIA

9. Third longitudinal vein furcate. . . . RHAMPHOMYIA
Third vein simple, not furcate. 10

10. No discal cell. . . . . CYRTOMA
A discal cell present. 11

11. Proboscis distinctly longer than the head. . . . 12
Proboscis not longer than the head. 14

12. All the legs of nearly equal length; hind femora much thickened. . . . . PACHYMERIA
Hind legs longer than the others; hind femora but little or not at all thickened. 13

13. Proboscis slender, directed backward or downward. EMPIS
Proboscis moderately thickened, directed forward. ITEAPHILA

14. Antennæ very short, apparently two-jointed, third joint compressed, with a short, thick, unjointed style. HORMOPEZA
Antennæ not very short, distinctly three-jointed; third joint awl or pear-shaped or spherical, with a two-jointed terminal style or bristle. 15

15. Proboscis as long as the head, conical, vertical; anterior metatarsi usually thickened in the male. . . . HILARA
Proboscis shorter than the head, horizontal; anterior metatarsi of the male not thickened. . . . . GLOMA

16. Third longitudinal vein furcate; discal cell present; anterior coxæ usually elongate. 17
Third longitudinal vein simple, discal cell wanting. . . 19

17. Front femora much thickened; two posterior veins arise from the discal cell. . . . . HEMERODROMIA
Front femora not much thickened; three posterior veins arise from the discal cell. 18

18. Antennæ with a long terminal bristle. . . . ARDOPTERA
Antennæ with a short terminal bristle; sixth vein obsolete before reaching the margin. . . . . CLINOCERA
Antennæ with an extremely short terminal style; sixth longitudinal vein not evanescent before reaching the margin. SYNAMPHOTERA

19. Anal cell, or at least the posterior basal cross-vein, present; antennæ with a long terminal bristle. . TACHYDROMIA
Anal cell wholly wanting. 20

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20. Front femora thickened. 21
Front femora not thickened. 22

21. Arista terminal. . . . . TACHYPEZA
Arista subdorsal. . . . . PHONEUTISCA

22. Arista terminal. . . . . DRAPETIS
Arista dorsal. 26

23. Proboscis short, vertical; palpi broad. . . . . STILPON
Proboscis slender; palpi narrow, slender. . PHONEUTISCA

HYBOS Meigen, Illiger's Magaz. II, 1803.
SYNECHES Walker, Dipt. Saund. 165, 1853.
SYNDYAS Loew, Dipternf. Sudafrikas, 560, 1860.
BLEPHAROPROCTUS Loew, Centur. II, 17, 1862 (Brachystoma).
OCYDROMIA Meigen, Syst. Beschr. II, 311, 1820.
EMPIS Linne, Fauna Suecica, 1763.
PACHYMERIA Stephen, Syst. Cat. 1829.
ITEAPHILA Zetterstedt, Ins. Lapp. 541, 1840.
RHAMPHOMYIA Meigen, Syst. Beschr. III, 1822.
HILARA Meigen, Syst. Beschr. III, 1822.
HORMOPEZA Zetterstedt, Ins. Lapp. 1840.
GLOMA Meigen, Syst. Beschr. III, 1822.
CYRTOMA Meigen, Syst. Beschr. IV, 1824.
LEPTOPEZA Macquart, Dipt. du Nord. 1827.
STILPON Loew, Neue Beitr. VI, 34, 1859.
DRAPETIS Meigen, Syst. Beschr. III, 1822.
TACHYDROMIA Meigen, Illiger's Magaz. II, 1803.
PHONEUTISCA Loew, Centur. III, 35, 1863.
TACHYPEZA Meigen, Syst. Beschr. VI, 341, 1830.
ARDOPTERA Macquart, Dipt. du Nord. 1827.
SYNAMPHOTERA Loew, Zeitschr. f. Ges. Naturw. VI, 453, 1858.
HEMERODROMIA Meigen, Syst. Beschr. III, 1822.
CLINOCERA Meigen, Illiger's Magaz. II, 271, 1803.

DOLICHOPODIDÆ.*

Usually metallic green or blue flies of small size; active, predaceous, found on vegetation or in damp situations. Head hemispherical, eyes large, rarely contiguous in the male. Front with bristles on the vortex only; ocelli present. Antennæ porrect; third joint

* The family characters and table are reproduced from Loew's Monograph of the family (Smithsonian Institution, 1863), to which the reader is referred for further information.

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simple with a terminal or dorsal arista. Proboscis short and stout. Hypopygium of male usually inflected under the abdomen, and composed of two consecutive parts, bearing at the end eight paired and two single appendages. The auxiliary vein terminates in the first longitudinal vein; third longitudinal vein not furcate; second basal cell united with the discal cell; anal cell small; three posterior cells. Legs more or less bristly, in the male usually with structural differences; empodia not developed pulvilliform.

Larvæ found in the ground, or in decaying vegetable matter. Pupæ free.

1. First antennal joint hairy above. 2
   First antennal joint glabrous above. 16
2. Hypopygium disengaged. 3
   Hypopygium more or less imbedded. 14
3. First joint of the hind tarsi bristly. 4
   First joint of the hind tarsi not bristly. 5
4. Face descending as far as the inferior angle of the eye.
   HYGROCELEUTHUS
   Face not descending as far as the inferior angle of the eye.
   DOLICHOPUS
5. Palpi of the male unusually large. . . . . DIOSTRACUS
   Palpi of the male small. 6
6. The last portion of the fourth longitudinal vein is parallel, or almost so, to the third longitudinal vein. . GYMNOPTERNUS
   The last portion of the fourth longitudinal vein is distinctly convergent towards the third longitudinal vein. . . . 7
7. The end of the fourth longitudinal vein is abruptly, or at least steeply deflected anteriorly. 8
   The end of the fourth longitudinal vein is only gradually deflected anteriorly. 9
8. Arista with the usual pubescence; the end of the fourth longitudinal vein, beyond the angular flexure, runs in curve.
   PARACLIUS
   Arista short-plumose; the end of the fourth longitudinal vein, beyond the rounded flexure, runs in a straight line.
   PELASTONEURUS
9. The face reaches down to the inferior corner of the eye.
   TACHYTRECHUS
   The face does not reach down to the inferior corner of the eye. 10

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10. Proboscis and palpi very much prolonged. . ♀ ORTHOCHILE
Proboscis and palpi not prolonged. 11

11 Scutellum hairy. . . . . ♀ SYBISTROMA
Scutellum not hairy. 12

12. Hypopygium sessile. . . . . HERCOSTOMUS
Hypopygium pedunculated. 13

13. Second antennal joint of usual shape. . . ♀ HYPOPHYLLUS
Second antennal joint rudimentary. . ♀ HALTERICERUS

14. Abdomen of male laterally compressed. . . ♀ ANEPSIUS
Abdomen of the male not compressed. 15

15. Second antennal joint of the usual transverse shape. ARGYRA
Second antennal joint with a thumb-like projection over the inside of the third. . . . . ♀ SYNTORMON

16. Third antennal joint in both sexes, or at least in the male, prolonged, pointed, and with an apical arista. . . . 17
Third antennal joint short even in the male, and if it should be somewhat prolonged, then neither pointed nor with an apical, but at the utmost with a subapical arista. . . . 23

17. Second antennal joint with a thumb-like projection over the inner side of the third. . . . . SYNARTHRUS
Second antennal joint without a thumb-like projection, transverse. 18

18. Posterior transverse vein distant from the margin of the wing; palpi incumbent. 19
Posterior transverse vein approximated to the margin of the wing; palpi hanging down. . . . . ♀ APHROSYLUS

19. Hypopygium pedunculated, free. . . . . ♀ SYSTENUS
Hypopygium sessile, more or less imbedded. . . . 20

20. The male abdomen has five segments. . . . ♀ SMILIOTUS
The male abdomen has six segments. 21

21. Third antennal joint prolonged also in the female. RHAPHIUM
Third antennal joint of the female not prolonged. . . 22

22. Third antennal joint of the male very much prolonged (small, less hairy species). . . . . ♀ XIPHANDRIUM
Third antennal joint of the male moderately prolonged (larger, more hairy species). . . . . PORPHYROPS

23. Fourth longitudinal vein forked. . . . . PSILOPUS
Fourth longitudinal vein simple 24

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24. Upper side of the thorax convex behind. 25
Upper side of the thorax behind with a somewhat concave depression. 40

25. Fifth longitudinal vein altogether wanting. . ° ACHALCUS
Fifth longitudinal vein distinct. 26

26. Distance of the posterior transverse vein from the margin of the wing equal to its own length or longer. 27
Distance of the posterior transverse vein to the margin of the wing shorter than its own length. 38

27. Posterior transverse vein unusually oblique. ° PLAGIONEURUS
Posterior transverse vein but little oblique. 28

28. Hypopygium distinctly bent under the venter. . . 29
Hypopygium not distinctly bent under the venter or entirely imbedded. 30

29. The face of both sexes very broad, not narrowed superiorly. ° THINOPHILUS
The face of both sexes rather narrow, somewhat narrowed superiorly. . . . . PEODES

30. Outer appendages of the hypopygium long, filiform. ° NEMATOPROCTUS
Outer appendages of the hypopygium not long, nor filiform. 31

31. Third joint of the male antennæ conspicuously large. LEUCOSTOLA
Third joint of male antennæ small. 32

32. Pulvilli of the male fore tarsi conspicuously enlarged. . 33
Pulvilli of the male fore tarsi not, or very slightly enlarged. 34

33. Pulvilli of the male fore tarsi not prolonged. . ° EUTARSUS
Pulvilli of the male fore tarsi prolonged. . . DIAPHORUS

34. Arista altogether or almost altogether apical. . . . 35
Arista dorsal. 36

35. Wings of considerable size (larger species). . LYRONEURUS
Wings of small size (smaller species). . . CHRYSOTUS

36. Legs of male with isolated, strong, spine-like bristles. ° TEUCHOPHORUS
Legs of the sexes without isolated, strong, spine-like bristles. 37

37. Face not narrowed above. . . . . SYMPYCNUS
Face considerably narrowed above. . . CAMPSICNEMUS

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38. All femora slender, abdominal segments with bristles before the hind margin. . . . . LIANCALUS
Fore femora incrassated towards the basis. . . . 39

39. Fore tibiæ with long thorns. . . . . SCELLUS
Fore tibiæ with very short little thorns. . . HYDROPHORUS

40. Arista apical, or at least subapical. 41
Arista distinctly dorsal. 42

41 Third and fourth longitudinal veins strongly convergent. MEDETERUS
Third and fourth longitudinal veins parallel. CHRYSOTIMUS

42. Male abdomen with six distinct segments. XANTHOCHLORUS
Male abdomen with five distinct segments. . SAUCROPUS

"Face of the male prolonged downward, and dependent in the shape of a silvery sheet or ribbon; in length, this ribbon is about equal to the upper part of the face between the antennæ and the lower end of the eye. In life, the ribbon is straight; in dried specimens its end is usually bent inwards. Cilia of the very small tegulæ in the male unusually long (bent backward, they would almost reach the end of the second abdominal segment); they can be folded like a fan, and then form a long tapering horn or spine-like body." POLYMEDON

"Hypopygium of male with four strong setulæ; tarsi without elongate pulvilli; distal portion of fourth longitudinal vein interrupted; posterior transverse vein remote from the border; otherwise similar to Diaphorus." . . . . ASYNDETUS

"First antennal joint bristly above, second rudimentary, third small, with an extraordinarily elongated dorsal bristle, which is dilated shovel-shaped at the end. Face descending below the angle of the eyes. Hind femora in front with only one preapical bristle; hind metatarsi unarmed. Hypopygium free; the exterior processes lamelliform. Last section of the fourth longitudinal vein strongly convergent toward the third, so that the terminations of the two veins are close together. M. (Tachytrechus) mæchus Loew." MACELLOCERUS.

SYRPHIDÆ.

Rather large to rather small, thickly or thinly pilose, often brightly colored flies. Ocelli present; males holoptic or dichoptic. Third joint of antennæ simple; with a dorsal bristle, or rarely a terminal style. Abdomen very variable in shape. Legs often with structural sexual peculiarities; empodia not developed. Three basal cells of wing large; first posterior cell closed near or at some distance before the margin of the wing; between the third and the fourth longitud-

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inal veins, and subparallel with them, crossing the anterior cross-vein, a false or spurious vein, nearly always present, and characteristic; face without subantennal grooves.

Flower-flies, usually only to be found in bright sunshiny weather. Larvæ found in decomposing organic matter, under bark, in soft mud, etc.; pupæ enclosed in the larval skin, the fly escaping through a circular anterior orifice (Diptera cyclorrhapha).

1. Antennæ with a terminal style. 2
   Antennæ with a dorsal bristle. 3
2. Antennæ cylindrical, first two joints elongate. . CERIA
   First two joints short, third compressed. . . PELECOCERA
3. Marginal cell of the wing closed and petiolate. . . 38
   Marginal cell open. 4
4. Anterior cross-vein of the wing distinctly before the middle of the discal cell, usually rectangular. 5
   Anterior cross-vein ending near or beyond the middle of the discal cell, usually oblique. 43
5. Antennæ elongate. 6
   Antennæ short. 11
6. Dorsum of thorax without yellow lateral stripes. . . 7
   Dorsum of thorax with yellow lateral stripes; large species. CHRYSOTOXUM
7. Face rounded, pilose, not tuberculate, oral margin not projecting. 8
   Face not evenly arched; tuberculate, or the oral margin projecting. 9
8. Large species; scutellum flattened, usually with spines or tubercles; a stump of vein in the first posterior cell from the third longitudinal vein. . . . . MICRODON
   Small species; scutellum without points; no such projecting stump. . . . . PIPIZA
9. Body clothed with sparse tomentum; all the femora thickened and with a row of short spines below (see, also, Myiolepta strigilata). . . . . LEPIDOSTOLA
   Body not tomentose; all the femora not thickened and with spines below. 10
10. Face tuberculate below, partly or wholly yellow; epistoma receding; face and front not wrinkled. . . PARAGUS
    Epistoma projecting; front and face black. . . . 16

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11. Face black in ground color. 12
Face more or less yellow in ground color. 20

12. Abdomen with only four visible segments; first two joints of the antennæ very short, third large, subquadrate, with a short, subterminal arista. . . . . NAUSIGASTER
Abdomen with more than four visible segments. . . 13

13. Hind femora distinctly thickened. 14
Hind femora but little or not at all thickened. . . . 15

14. Scutellum unusually large, nearly square; males dichoptic. CHALCOMYIA
Scutellum not unusually large, considerably broader at the base; males holoptic and with a facial tubercle. . MYIOLEPTA

15. Epistoma projecting; small black species. . . . 16
Face tuberculate, the oral margin not projecting. . . 17
Face rounded, pilose, not tuberculate, the oral margin not projecting. . . . . PIPIZA

16. Front in female, and the face in both sexes usually, with transverse wrinkles. . . . . CHRYSOGASTER
Face and front not wrinkled; face pilose, without tubercle. PSILOTA

17. Metallic green, metallic green and black, or black species; abdomen oval, never with entire shining cross-bands. CHILOSIA
Black with more or less metallic green or blue, with yellow or yellowish abdominal markings, or if not, at least with entire shining cross-bands; abdomen usually elongate. . . 18

18. Wings not longer than the abdomen; ocellar tubercle large; abdomen depressed, long elliptical, somewhat narrowed toward the base, the lighter markings ferruginous or orange-yellow. . . . . PYROPHÆNA
Wings longer than the abdomen, usually more slender species, abdominal cross-bands yellow or greenish yellow, or sometimes shining metallic. 19

19. Front tibiæ, distally, and tarsi of the male dilated, those of the female a little widened. . . . . PLATYCHIRUS
Front tibiæ and tarsi slender in both sexes. MELANOSTOMA

20. Dorsum of thorax with yellow lateral stripes. . . . 29
Dorsum of thorax not with yellow lateral stripes. . . 21

21. Abdomen narrowed toward the base, in outline club-shaped or spatulate. 22
Abdomen oval or slender, not spatulate or club-shaped. 24

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22. Hind femora slender; abdomen elongate, usually slender toward the base; front of female long, narrowed above. BACCHA
Hind femora thickened. 23

23. Epistoma produced anteriorly, in profile deeply concave from antennæ to oral margin; third joint of antennæ rounded. SPHEGINA
Epistoma produced more downward, in profile gently concave; third joint of antennæ not rounded. . . . NEOASCIA

24. Abdomen with definite yellow cross-bands, interrupted or entire. 25
Abdomen not with definite yellow cross-bands. . . . 32

25. Hind femora extraordinarily thickened. . . . SYRITTA
Hind femora slender. 26

26. Sixth abdominal segment in the male as long as the two preceding together, cylindrical; fifth segment in the female one-half as long as the preceding. . . . . EUPEODES
Sixth segment not peculiar; the fifth segment in the female one-third or one-fourth as long as the preceding. . . 27

27. Front very convex; eyes of male with an area of enlarged facets above. . . . . CATABOMBA
Front not remarkably convex. 28

28. Third longitudinal vein with a distinct curvature into the first posterior cell; third joint of antennæ elongate oval. DIDEA
Third longitudinal vein straight or gently curved; epistoma not produced (if produced in a long porrected snout, Rhingia.) SYRPHUS

29. Dorsum of thorax with a median cinereous line. MESOGRAPTA
Dorsum without such line. 30

30. Eyes of male with an area of enlarged facets above; fourth segment of abdomen with two median yellow stripes and an oblique side spot. . . . . ALLOGRAPTA
Eyes of male not with an area of enlarged facets above; fourth abdominal segment not so marked. 31

31. Face projecting below; slender species. . SPHÆROPHORIA
Face receding; abdomen oval, at least not slender. XANTHOGRAMMA

32. Abdomen oval, black, basal portion light-colored; thickly pilose species. . . . . LEUCOZONA
Thinly pilose species, not so marked. 33

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33. Hind femora thickened. 34
Hind femora slender. 37

34. Species wholly or chiefly reddish or lutescent. . . . 36
Black species, sometimes with luteous spots on face, humeri, basal angles of abdomen, etc. 35

35. Scutellum unusually large, nearly square in outline; males dichoptic. . . . . CHALCOMYIA
Scutellum not unusually large, considerably broader at the base; males holoptic. . . . . MYIOLEPTA

36. Face carinate; abdomen oval. . . . . BRACHYOPA
Face produced, obtusely tuberculate. HAMMERSCHMIDTIA

37. Epistoma produced into a long porrected snout. . RHINGIA
Epistoma not at all produced. . . . . CHILOSIA

38. Third longitudinal vein bent deeply into the first posterior cell. 40
Third vein not deeply bent into the first posterior cell; antennæ elongate. 39

39. Arista feathery plumose. . . . . VOLUCELLA
Arista very densely plumose, appearing like a solid mass. COPESTYLUM

40. Hind femora with sharp tooth-like projection below near the outer end; large species. . . . . MILESIA
Hind femora without tooth-like projection below. . . 41

41. Frontal triangle of male strongly protuberant. DOLIOSYRPHUS
Frontal triangle not protuberant. 42

42. Thorax with distinct yellow markings; femora thickened; hypopygium large. . . . . PTEROPTILA
Thorax without distinct yellow markings; hind femora occasionally thickened; hypopygium not prominent. ERISTALIS

43. Arista plumose. 44
Arista bare or pubescent. 45

44. Thinly pilose, abdomen with yellow bands. . SERICOMYIA
Thickly pilose, abdomen without yellow. . . ARCTOPHILA

45. Third longitudinal vein bent deeply into the first posterior cell; hind femora thickened. 46
Third vein only gently curved. 51

46. Face with a sharp longitudinal ridge in the middle; hind femora with an angular protuberance below near outer end. TROPIDIA

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Face tuberculate or arched, not carinate. 47

47. Thorax and scutellum very densely pollinose above. PTERALLASTES
Scutellum not densely pollinose above. 48

48. Third joint of antennæ broad, thorax not vittate. . . 49
Third joint oval; thorax usually vittate above. HELOPHILUS

49. Thickly pilose. . . . . MALLOTA
Thinly pilose. 50

50. Hind tibiæ of male with an internal median spur. TEUCHOCNEMIS
Hind tibiæ of male not with an internal median spur. POLYDONTA

51. Hind femora thickened, with a bifid spur below on outer end. STENOGASTER
Hind femora not with a bifid spur below. 52

52. Slender species, abdomen narrowed on basal portion. BACCHA
Abdomen in no wise club-shaped or narrowed basally. . 53

53. Thorax with distinct yellow markings other than on the humeri. 62
Thorax not with distinct yellow markings other than rarely on the humeri. 54

54. Face transversely arched or carinate, not produced, not tuberculate; abdomen more or less elongate and nearly bare. 55
More or less thickly pilose species, often large. . . 57

55. Hind femora extraordinarily thickened; anterior cross-vein rectangular. . . . . SYRITTA
Hind femora more or less thickened; cross-vein oblique. 56

56. Face sharply carinate. . . . . TROPIDIA
Face transversely arched. . . . . XYLOTA

57. Scutellum, margin of the thorax, and the pleuræ with bristly hairs. . . . . CHRYSOCHLAMYS
Thorax wholly without bristles. 58

58. Face short, not produced, concave from antennæ to tip, not tuberculate; hind femora thickened. 59
Face produced, long. 60

59. Abdomen elongate. . . . . BRACHYPALPUS
Abdomen very broad, thorax densely pilose, very large species. POCOTA

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60. Face produced forward, pointed, concave from antennæ to tip, not tuberculate, sub-carinate; hind femora thickened. CRIOPRORA
Face not evenly concave, tuberculate or convex. . . 61

61. Third joint of antennæ produced above into a conical process, terminating in the thickened arista. . . MERAPIOIDES
Third joint of antennæ obliquely oval; hind femora rarely thickened.* . . . . . CRIORRHINA

62. Hind femora with a conical, tooth-like protuberance below, near the distal end. . . . . SPILOMYIA
Hind femora without such protuberance. . . . 63

63. Antennæ inserted low down, near the middle of the head in profile; face not longer than the front. . . TEMNOSTOMA
Antennæ situated high up, on a conical process, front short, face much produced downward; antennæ long or short. SPHECOMYIA

LEPIDOSTOLA Mik, Wien. Ent. Zeit. V. 278, 1886.
(Lepidomyia Loew, Lepromyia Will.)
HAMMERSCHMIDTIA Schummel, Oken's Isis, 1834, p. 740.
(Exochila Rond., Eugeniamyia Will.)
(For descriptions of genera and species, see Williston, Synopsis, etc. Bull. U. S. National Museum No. 31, 1886[7].)

CONOPIDÆ.

Thinly pilose or nearly bare, more or less elongated species. Head broad; front broad in both sexes; ocelli present or absent. Antennæ porrect, composed of three simple joints, the third with a dorsal arista or terminal style Oral opening large; proboscis slender. Abdomen more or less elongated, often constricted toward the base. Basal cells of wing usually large, the third (anal) closed; three posterior cells, the first closed or much narrowed; no spurious vein.

Flower flies. Larvæ parasitic upon hymenoptera and orthoptera. Pupæ enclosed in larval skin (cyclorrhapha).

1. Antennæ with a terminal style; proboscis directed forward, without medium hinge; abdomen constricted toward the base. 2

* If thinly pilose, with the abdomen nearly bare, and the hind femora thickened, see Xylota tuberans.

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Antennæ with a dorsal or subdorsal arista. 4

2. Face with a median ridge, without X-shaped grooves. ○ TROPIDOMYIA WILL.

Face with a well-marked X-shaped groove. 3

3. Femora and tibiæ not thickened or dilated, or, if so, the thickening regular; small cross-vein of the wings nearly opposite the tip of the auxiliary vein, and near the middle of the discal cell. . . . . CONOPS

Femora irregularly thickened toward the base, the tibiæ with irregular outlines; small cross-vein of wings near the outer third of discal cell. . . . . PHYSOCEPHALA

4. Proboscis directed forward, not bent near the middle. ZODION

Proboscis bent near the middle, the distal part folding back. 5

5. Vertex with bristles; tibiæ spurred; face carinate, not grooved; ovipositor of female very long. . . . STYLOGASTER

Vertex and tibiæ without bristles; face with X-shaped groove. 6

6. Anal cell short; ovipositor elongate and folded beneath the abdomen. . . . . DALMANNIA

Anal cell elongate, acute. 7

7. Cheeks not as broad as the vertical diameter of the eye. ONCOMYIA

Cheeks as broad or broader than the vertical diameter of the eye. MYOPA

CONOPS Linne, Fauna Suecica, p. 1797, 1761.

PHYSOCEPHALA Schiner, Wien. Ent. Monatschr. V, 1861.

ZODION Latreille, Precis etc. 1796.

ONCOMYIA Robineau Desvoidy, Dipt. des Env. de Paris, Myopaires, 59, 1853.

MYOPA Fabricius, Syst. Entom. 798, 1775.

DALMANNIA Robineau Desvoidy, Essai sur les Myodaires, 248, 1830.

STYLOGASTER Macquart, Hist. Nat. des Dipt. II, 38, 1835.

[For description of species, see Williston, Trans. Connecticut Acad. VI, 377.]

PIPUNCULIDÆ.

Small, thinly pilose or nearly bare species. Head nearly spherical, broader than the thorax, composed chiefly of the very large eyes. Eyes in the male contiguous, front in the female narrow.

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Antennæ small, short, three-jointed, the third joint oval or reniform, with a dorsal arista. Face small, narrow. Proboscis small. Hypopygium thickened, clubbed; ovipositor usually elongate and folded under the abdomen. Basal cells of wing well developed, the third elongate; one submarginal, three posterior cells present; first posterior cell narrowed in the margin. . . . . PIPUNCULUS

The flies are met with on flowers or in sweepings, and are readily distinguished by their large spherical head. Larvæ parasitic; pupæ obtected.

PLATYPEZIDÆ.

Head hemispherical or spherical, as broad or broader than the thorax. Face usually broad and short. Antennæ porrect, three-jointed, the third somewhat elongate, circular, pear-shaped or conical, with a terminal arista. Proboscis short, but little prominent. Eyes bare, contiguous in the male; ocelli present. Abdomen comparatively short; genitalia projecting in Callomyia. Legs short and strong; hind legs often thickened, especially the tarsi; pulvilli present. Basal cells of wing small, the anal usually reaching to the margin; third longitudinal vein simple, the fourth sometimes furcate; discal cell sometimes wanting. Small flies.

1. Discal cell present. 2
   Discal cell wanting. 3

2. Fourth longitudinal vein simple. . . . . CALLOMYIA
   Fourth vein furcate. . . . . PLATYPEZA

3. Fourth vein simple. . . . . PLATYCNEMA
   Fourth vein furcate. . . . . OPETIA MEIG.

CALLOMYIA Meigen, Klassif. 1804.
PLATYPEZA Meigen, Illiger's Mag. 1803.
PLATYCNEMA Zetterstedt, Dipt. Scand. I, 1842.

ŒSTRIDÆ.

Moderately large to large, plump, thickly or thinly pilose flies. Head large; face and front broad. Antennæ small, three-jointed, more or less concealed in a subantennal cavity or grooves; first two

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joints very short, the third round or oval, with a dorsal arista. Mouth opening small, the mouth parts small or rudimentary. Eyes comparatively small, bare. Ocelli present. Abdomen never elongate; hypopygium concealed; ovipositor often projecting. Legs moderately strong, the hind pair sometimes elongate. Tegulæ usually large, concealing the halteres; sometimes small, and long ciliate. Wings usually with fine transverse wrinkles; third vein simple; first posterior cell fully or narrowly open, or closed and petiolate; basal cells small; discal cell sometimes wanting; the posterior part of the wings broadly unsupported by veins.

Bot flies, parasitic in the larval stage in the skin, stomach, frontal or pharyngeal cavities of perrisodactyls, artiodactyls, rodents, elephant, monkeys, etc. Each species is parasitic in the same way, and, as a rule, on the same species of mammal; and allied species usually have similar habits, on allied animals. The occurrence of bot-flies on other than mammals needs verification. Pupal stage passed in the ground.

1. First posterior cell wide open, the fourth vein running straight to the border of the wing. (Horses.) . GASTROPHILUS
   First posterior cell narrowed or closed, the fourth vein distinctly bent forward. 2
2. First posterior cell closed and petiolate. (Sheep.) . OESTRUS
   First posterior cell narrowly open. 3
3. Arista plumose on the upper side. (Rodents.) . CUTEREBRA
   Arista bare; pilose species. 4
4. Subantennal grooves separated by a median ridge, terminating in a shield-shape surface below, limited on each side by a slender groove running to the oral margin. 5
   Subantennal grooves continuous to the oral margin, feebly separated from each other. (Deer.) . . CEPHENOMYIA
5. Palpi present. (Reindeer.) . . . . . OEDEMAGENA
   Palpi wanting. (Oxen, etc.) . . . . . HYPODERMA

GASTROPHILUS Leach, 1817.
HYPODERMA Clark, Essay on Bots, 1815.
OEDEMAGENA Latreille, Fam. Nat. 1825.
OESTRUS Linne, Fauna Succica, 1761.
CEPHENOMYIA Latreille, Fam. Nat. 1825.
CUTEREBRA Clark, Essay on Bots, 1815.

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MUSCIDÆ.

The very large family of Muscidæ has been divided into numerous subdivisions, which by some entomologists are accredited with family rank. The number and limits of these sub-families, are more or less the subjects of diverse opinion by dipterologists. The following characters will apply to the family in its entirety: Antennæ three jointed, the third joint simple, usually round or oval, with dorsal arista. Proboscis always present, usually short, with dilated labella, sometimes elongate and adapted for piercing. Auxiliary vein sometimes entirely wanting, sometimes coalescent with the first longitudinal vein; one submarginal, three posterior cells present; basal cells small, the second sometimes coalescent with the discal, the latter sometimes absent; pulvilli present; empodia never developed pulvilliform.

The flies are often small, or minute, usually more or less bristly, and not often much pilose. The larvæ are very variable in their habits; pupæ always enclosed in the larval skin.

Two chief divisions are recognized, based upon the size of the tegulæ, the Muscidæ calyptratæ and acalyptratæ. In the former they are well developed, in the latter small or rudimentary. All the families of the former (except the Anthomyidæ) have the first posterior cell either closed or narrowly open, a character rarely found in the second division.

The differential characters of the calyptratæ have already been given. The flies have hitherto received but little study in this country and it is at present impossible to give a table of the genera that would be of much value.

For the Muscidæ acalyptratæ I am prepared to give only a translation, with some modifications, of Schiner's table of subfamilies (Fauna Austriaca), with a reproduction of the characters given by Loew in his Monographs.

MUSCIDÆ ACALYPTRATÆ.

1. Auxiliary vein present, distinctly separated from the first longitudinal vein, terminating separately in the costa; the first longitudinal vein usually terminates at or beyond the middle of the wing. 2

   Auxiliary vein absent, rudimentary or incomplete; the first longitudinal vein usually terminates before the middle of the wing. 13

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2. Anterior border of the mouth with vibrissæ. 3
Oral vibrissæ not present. 7

3. The distance between the anterior and posterior cross-veins (on the fourth vein) four or five times less than that between the posterior cross-vein and the posterior margin of the wing. HETERONEURIDÆ
The distance between these veins but little less or greater than that to the hind margin. 4

4. Abdomen elongate, usually cylindrical, narrowed at the base, behind somewhat decurved; male genitalia usually clubbed, projecting from the abdomen. 5
Abdomen comparatively short and rather broad, never cylindrical, or narrowed at the base; male genitalia but little or not projecting; wings large. 6

5. Front on the sides, and the vertex, with long bristles. CORDYLURIDÆ
Vertex, only, with long bristles; body always shining black. SEPSIDÆ

6. Proboscis horny, shining; labella usually pointed; third antennal joint elongate; males often woolly pilose. CORDYLURIDÆ
Proboscis not horny or shining; third antennal joint short or round; males never woolly pilose. PHYCODROMIDÆ, HELOMYZIDÆ

7. Antennæ much elongate, and porrect; second joint as long or longer than the third. . . . . SCIOMYZIDÆ
Antennæ not elongate, or, if so, decumbent; second joint always shorter than the third. 8

8. Two posterior basal cells very small and indistinct. LONCHÆIDÆ, SAPROMYZIDÆ
Posterior basal cells large and very distinct. . . . 9

9. Hind tibiæ with a preapical bristle. . . . SCIOMYZIDÆ
Hind tibiæ without preapical bristle. 10

10. Front with bristles on the sides; the auxiliary vein terminates steeply in the costa. . . . . TRYPETIDÆ
Front bristly only on the vertex or upper part; the auxiliary vein terminates acutely in the costa. 11

11. Legs elongate, often very long; abdomen slender and long, nearly cylindrical, often narrowed, or pedicellate at base. 12
Legs not elongate; abdomen never narrowed at base. ORTALIDÆ

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12. First posterior cell much narrowed in the margin. MICROPEZIDÆ
First posterior cell but little or not at all narrowed in the margin. SEPSIDÆ

13. Hind metatarsi shorter than the following joint and much thickened. . . . . BORBORIDÆ
Hind metatarsi longer than the following joint and not more thickened. 14

14. Second basal cell united with the discal cell; posterior cross-vein present. 15
Second basal and discal cells distinct, or, if united, the posterior cross-veins wanting. 18

15. Legs long and slender; abdomen elongate and narrow. MICROPEZIDÆ
Legs moderately long and usually rather strong; abdomen ovate, or elongate elliptical. 16

16. Front without bristles, or, at most, bristly at the top; third joint of antennæ rounded, or, if elongate, the head triangular in profile. . . . . OSCINIDÆ
Front bristly at least as far as the middle; third antennal joint elongate, oval, or rounded; head not triangular in profile. 17

17. Face large; mouth opening large; anal cell wanting. EPHYDRIDÆ
Face not large and arched; anal cell present. DROSOPHILIDÆ

18. Oral vibrissæ present. 19
No vibrissæ on oral margin. 22

19. Front bristly at the vertex only, or not at all. . . SEPSIDÆ
Front bristly at least as far as the middle. . . . 20

20. Posterior cross-vein before the middle of the wing, approximated to the anterior cross-vein. . . . AGROMYZIDÆ
Posterior cross-vein at or beyond the middle of the wing, sometimes absent. 21

21. Arista long plumose or pectinated. ASTEIDÆ, DROSOPHILIDÆ
Arista shortly and thickly plumose, or pubescent, or bare, GEOMYZIDÆ

22. Anal cell of considerable size and distinct. . . . 23
Anal cell small and indistinct. 24

23. Front bristly. . . . . TRYPETIDÆ
Front bare, or bristly at the vertex only. . . PSILIDÆ

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23. Silvery white or whitish gray species with unspotted wings; posterior cross-vein wanting. . . . PHYTOMYZIDÆ
Reddish yellow or brownish red species, often with spotted wings. . . . . OPOMYZIDÆ

CORDYLURIDÆ.

Neuration of the wings complete; both posterior basal cells of considerable size; auxiliary vein well separated from the first longitudinal vein; first longitudinal vein bare. Whole lateral border of the front bristly; anterior border of the mouth with strong, usually numerous vibrissæ. Tibiæ with spurs.

HELOMYZIDÆ.

Neuration of the wings complete; costa bristly; first longitudinal vein not abbreviated, but bare; the auxiliary vein is often rather approximated to it. Front bristly on its upper half only; a stout bristle at each side of the anterior border of the mouth. All the tibiæ with spurs and outwards before their tips with a more or less developed erect bristle.

SCIOMYZIDÆ.

Neuration of the wings complete; two posterior basal cells of rather considerable size; auxiliary vein well separated from the first longitudinal vein. On the lateral border of the front before the vertical bristles there are two bristles, one behind the other; face proportionately long without distinct furrows for the antennæ; border of the mouth sharp, without vibrissæ. Middle tibiæ with a greater number of bristles at the tip; all the tibiæ on the outside before the tip with a small erect bristle

PSILIDÆ.

Body elongated, with short hairs and almost without bristles. Neuration of the wings complete; the auxiliary vein lies close by the first longitudinal vein, but diverges from it at its end and runs towards the border of the wing; by a transverse fold most characteristic in this family running from the tip of the auxiliary vein as far as the base of the third posterior cell, the outward end of the auxiliary vein is obliterated; the posterior basal cells are very large. Front with only a few bristles in the neighborhood of the crown; face receding; opening of the mouth small and with no bristles at its border. Only the middle tibiæ have spurs, and all the tibiæ are without erect bristle on the outside.

MICROPEZIDÆ.

Body slender, elongated, with very short hairs and very scarce bristles. Legs proportionately short; only the middle tibiæ have spurs, these being generally very small and weak; no small erect bristle on the exterior side of the tibiæ. Neuration of the wings

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complete; first longitudinal vein bare; the auxiliary vein is very close by it and diverges from it towards its end only; the two posterior basal cells are very large. Front with some bristles in the neighborhood of the crown only; bordering of the mouth without vibrissæ. Last segment of the abdomen of the female prolonged into a blunt, cylindrical tube.

ORTALIDÆ.

Neuration of the wings complete; auxiliary vein separated from the first longitudinal vein and running to the border of the wing in the usual way, under an acute angle and remaining perfectly distinct in its whole length; third longitudinal vein generally with coarse hairs; two posterior basal cells large, and the outward one frequently prolonged in an acute angle. Front with bristles on the upper part only; no vibrissæ at the border of the mouth; clypeus commonly very much developed, and proboscis often very much thickened. Middle tibiæ alone with spurs; no tibiæ with an erect bristle on the exterior side before the tip. Ovipositor of the female rather flattened and horny, consisting of three elongated segments, forming three drawers like those of a telescope, and ending in a simple point.

TRYPETIDÆ.

Neuration complete; the end of the auxiliary vein runs steeply to the border of the wing and becomes obsolete; first longitudinal vein always with bristles, the third frequently, the fifth sometimes; two posterior basal cells rather large, the hindmost is often prolonged to a point. Front on each side with two rows of bristles, one of which is more above and interiorly, the other below and exteriorly. Border of the mouth with no vibrissæ. Clypeus none or rudimentary. Proboscis never incrassated. Only the middle tibiæ with spurs; all tibiæ without erect bristle on the outer side before the tip. Ovipositor horny, consisting of three elongated retractile segments like the drawers of a telescope, the last of which ends in a simple point.

LONCHÆIDÆ.

Neuration complete; the auxiliary vein runs to the border of the wing in the usual way, under an acute angle and without becoming obsolete, and is verv near to the first longitudinal vein; this vein is bare; the two posterior basal cells are small. Front at each side with a single row of bristles; border of the mouth without vibrissæ; clypeus rudimentary. Middle tibiæ with spurs; all tibiæ without erect bristle on the exterior side before the tip. The ovipositor of the female consists of three joints and is rather horny, quite flattened, and ends in a simple point.

SAPROMYZIDÆ.

Neuration complete; auxiliary vein of the usual structure, frequently very much approximated to the first longitudinal vein; costa of the wings without bristles or marginal spine; longitudinal veins without peculiar hairs; posterior basal cells small. Front with a

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single row of bristles on each side; no vibrissæ on the border of the mouth; clypeus rather rudimentary. Only the middle tibiæ have terminal spurs; all tibiæ with a small erect bristle on the exterior side before the end. Ovipositor of the female not horny.

PHYCODROMIDÆ.

Thorax, scutellum and abdomen flat; pleuræ excised above the coxæ. Front bristly; border of the mouth hairy, with no distinct vibrissæ. Legs stout, tibiæ with spurs and each with an erect hair or small bristle on the outside before the tip; the first joint of the posterior tarsi not abbreviated; last joint of all tarsi enlarged, with stout claws and long pulvilli. Neuration of the wings complete; auxiliary vein distinct in its whole length; costa without bristles; basal cells not small.

HETERONEURIDÆ.

Neuration of the wings complete, but the first longitudinal vein rather short, and the auxiliary vein very much approximated to it; costa without bristles; basal cells small. Front with long bristles; border of the mouth with a vibrissa at each side; clypeus not developed; palpi broad and proportionately large. Legs, and especially the tarsi, slender; middle and posterior tarsi with spurs; all the tibiæ without erect bristle on the exterior side before the tip; claws and pulvilli very small.

OPOMYZIDÆ.

Front with stout bristles above; clypeus rudimentary; border of the mouth either pubescent or with long hairs, the foremost of which sometimes forms a distinct vibrissa. Proboscis short; palpi rather small. Middle tibiæ with a distinct, posterior tibiæ with a very short spur; the exterior side of the tibiæ without erect small bristle before the tip; claws and pulvilli small. Wings elongated and narrow, with no bristles on the costa; the axillary incision and alulæ are either wanting or very diminutive. First longitudinal vein much abbreviated; the auxiliary vein becomes obsolete before reaching completely the first longitudinal vein; the latter emits, shortly before its end, towards the costa, a branch, which may be considered as the end of the auxiliary vein; basal cells small.

SEPSIDÆ.

Head rounded; front bristly; border of the mouth more or less hairy, the foremost hair often imitating a vibrissa; clypeus rudimentary; proboscis short; palpi evceedingly small or wanting. Abdomen tapering towards the base. Middle tibiæ with distinct spurs; claws and pulvilli small. Neuration of the wings complete; the auxiliary vein distinctly separated from the first longitudinal vein; the two posterior basal cells rather large.

DIOPSIDÆ.

Neuration of the wings incomplete from the absence of the foremost of the two small basal cells; the auxiliary vein very much

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approximated to the first longitudinal vein. Head prolonged in two lateral apophyses bearing the eyes; front bristly only on the upper part; border of the mouth with no vibrissæ. Anterior femora incrassated.

PIOPHILIDÆ.

The auxiliary vein, on its whole length, is coalescent with the first longitudinal vein; with this exception the neuration of the wings is complete. Front with some small bristles above only; border of the mouth with a vibrissa on each side; clypeus rudimentary; legs rather stout, almost of the structure of those of the Sciomyzidæ; middle tibiæ with spurs; all the tibiæ without erect bristle on the exterior side before the tip.

EPHYDRIDÆ.

Face convex, with no distinct furrows for the reception of the antennæ and without vibrissæ, though frequently beset with hairs or bristles; clypeus very much developed; opening of the mouth large; proboscis incrassated with a swollen chin. Neuration of the wings incomplete; the auxiliary vein distinct only at its base; the foremost of the two small basal cells reunited with the discal cell. Middle tibiæ with spurs.

GEOMYZIDÆ.

Front with stout bristles above; border of the mouth with vibrissæ. Clypeus rudimentary. Middle tibiæ with spurs; all the tibiæ with a small erect hair on the exterior side before the tip. Wings with bristles on the costa; first longitudinal vein exceedingly abbreviated, and the auxiliary vein so approximated to it that it is distinctly separated from it only towards the base; the two posterior basal cells very small.

DROSOPHILIDÆ.

Front with bristles above; face with distinct sub-antennal furrows; at the border of the mouth there is a feeble, frequently rather indistinct small vibrissa. Middle tibiæ with very feeble spurs; on the exterior side of the tibiæ there is either a very small or no erect bristle before the tip. Wings without bristles on the costa; the first longitudinal vein is exceedingly abbreviated; of the auxiliary vein there is only a rudiment; the discal cell is usually, but not in all genera, united with the foremost of the two small basal cells. Claws and pulvilli very small.

OSCINIDÆ.

Front without bristles, the crown having only a few short ones; border of the mouth without vibrissæ, which, however, are represented sometimes by a small hair on each side. Middle tibiæ with small spurs; all the tibiæ without erect bristle on the exterior side before the tip. Costa of the wings without bristles. The auxiliary vein is completely wanting; the anterior of the two small basal cells is united with the discal cell, the posterior one is totally wanting.

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AGROMYZIDÆ.

Front with strong bristles; border of the mouth with a vibrissa on each side. Middle tibiæ with a terminal spur; all the tibiæ on the exterior side without erect bristle before the tip. Wings without bristles on the costa; first longitudinal vein very short, and the auxiliary vein connected with it at the tip; basal cells existing, but small; posterior transverse vein generally far distant from the border of the wing.

PHYTOMYZIDÆ.

Front bristly; border of the mouth with vibrissæ on each side. Middle tibiæ with spurs; all the tibiæ without erect bristle on the exterior side. Wings without bristles on the costa; first longitudinal vein very short; auxiliary vein connected with it at the tip; basal cells existing, but small; posterior transverse vein wanting.

ASTEIDÆ.

Front bristly above; border of the mouth with a vibrissa at each side. Middle tibiæ with spurs; all the tibiæ without erect bristle on the exterior side. Wings without bristles on the costa; first longitudinal vein exceedingly short; auxiliary vein connected with it only at the tip; second longitudinal vein very short; two posterior basal cells as well as the posterior transverse vein wanting.

BORBORIDÆ.

Thorax, scutellum, and abdomen flat; front bristly; face excavated, with a vibrissa on each side of the border of the mouth; clypeus developed; first joint of the posterior tarsi abbreviated. Neuration of the wing incomplete, only a commencement of the auxiliary vein being at best visible; the hindmost two basal cells are not complete in all genera.

PHORIDÆ.

Small, hunchback-like, nearly bare species. Head small, flattened; face very short, oral opening large. Front broad in both sexes; ocelli present. Antennæ apparently one or two-jointed, the terminal joint round, with a dorsal or apical bristle. Abdomen rather short, narrowed posteriorly; genitalia of male often prominent, in the female projecting. Coxæ elongate, the femora more or less, the hind pair often extraordinarily, widened and flattened. Wings large; on the anterior part with two strong veins, not reaching beyond the middle, from which from three to five weak veins apparently arise and run across the wing.

The larvæ feed upon living or dead snails, beetles, hymenoptera and lepidoptera, or on fungi, decaying vegetables, etc. The flies have a peculiar hunchback appearance, rapidly running hither and thither.

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1. Front entirely without bristles. . . . . GYMNOPHORA
   Front with long bristles. 2
2. Middle tibiæ beset with bristles along the outer side. TRINEURA
   Middle tibiæ with a few or no bristles on the outer side. PHORA

TRINEURA Meigen, Illiger's Magaz. 1803.
GYMNOPHORA Macquart, Hist. Nat. Dipt. 1835.
PHORA Latreille, Hist. Nat. des Crust. etc. 1804.

HIPPOBOSCIDÆ.

Head depressed, flattened, closely attached to the emarginate thorax. Antennæ inserted in depression near the oral margin, apparently one-jointed, with a terminal bristle or style. Face short. Eyes small; ocelli present or absent. Thorax depressed, flattened, leathery, with a well-marked transverse suture. Scutellum broad and short. Abdomen oval, flattened, horny above. Legs short and strong, broadly separated by the sternum, the femora dilated; tarsi short and broad, the first joint of the four anterior, or of all, abbreviated; claws strong and well developed, often toothed below. Wings sometimes absent; when present, with variable neuration, the veins on the front part usually strong, and those posteriorly weak.

The flies are parasitic in their adult stage upon mammals and birds; the immature stages are completed within the body of the female, the large puparium being extruded only a little before the time for the mature fly to emerge.

1. Wings wholly wanting. . . . . MELOPHAGUS
   Wings present, functional, or rudimentary. 2
2. Claws below with three teeth; ocelli present. ORNITHOMYIA
   Claws with two teeth; ocelli usually wanting. 3
3. Wings rudimentary, or, if present, with weak and indistinct veins. . . . . LIPOPTENA
   Wings large, the veins in front strong. 4
4. The furcation of the second and third veins at or beyond the middle of the wing. . . . . HIPPOBOSCA
   The furcation of the second and third veins takes place near the base of the wing. . . . . OLFERSIA

OLFERSIA Wiedemann, Auss. Zweifl. Ins. II, 1830.

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ORNITHOMYIA Latreille, Hist. Nat. des Crust. etc. XIV, 1804.
LIPOPTENA Nitsch, Germ. Mag. f. Ent. III, 1818.
MELOPHAGUS Latreille, Hist. Nat. des Crust. etc. XIV, 1804.
HIPPOBOSCA, Linne, Fauna Suecica, 1761.

NYCTERIBIDÆ.

Wingless, pupiparous flies, parasitic upon bats in the adult stage. Head small, eyeless, folding bace into a groove on the dorsum of the thorax. Legs long, spider-like; claws well developed.

NYCTERIBIA.

NYCTERIBIA Latreille, Hist. Nat. des Crust. etc., XIV, 1804.

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† New genera are printed in small capitals.

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20 Bull. Soc. Ent. Fr. 1884, 95. [ANCYCLOGASTER armata, Tachinidæ, Mex.]

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21 BIGOT, J. F. M. Bull. Soc. Ent. Fr. 1885. [RHAMPHININA dubia, SIPHONIOMYIA melas, Dexidæ, Mex.; HOMODEXIA rufina, Dexidæ, California: STICTOMYIA longicornis, Ortalidæ, Mex.: DIMORPHOMYIA calliphorides, Tachinidæ, Mex.]

22 Rev. d'Entomologie, 1885, 255–269. [Dexidæ, Sarcophagidæ; notes; synoptic table of genera.]

23 Dipt. nouv. etc. An. Soc. Ent. Fr. 1885, 225–246. [Pupipara; notes, table of genera; Olfersia impressa, 237, Calif.; sordida, 239, Guatemala: Ornithomyia nitens, 241, Panama; haitiensis, 242, Hayti: Nycteribia mexicana, 245, Mex.]

24 Dipt. nouv. ou peu connus; Annales Soc. Ent. France, 1885, 263–304. [PROBOSCIMYIA siphonina, 267, Rocky Mountains: Limnophora limbata, 271, normata, 272, rufipes, 272, anthrax, 274, Mexico: Hydrophoria ? pictipes, 275, calopus, 275, Mexico; nigricauda, 276, Rocky Mts.: Chortophila spinipes, 279, Rocky Mts.: Trichopticus crenatus, 281, Mex.: Homalomyia mexicana, 284, Mex.; dentata, 284, rupecula, 285, Rocky Mts.: Spilogaster plumifera, 288, Cuba; fulva, 289, Wash. Terr.; fulviventris, 291, Calif.: Anthomyia monticola, 297, anthracina, 298, Rocky Mts.; oculifera, 299, Baltimore: Hylemyia flavicaudata, 299, Wash. Terr.: Dialyta bicolor, 802, Mex.]

25 Bull. Soc. Ent. Fr. 1886. p. CIII. [RHABDOSELAPHUS mus, Calif.]

26 Bull. Soc. Ent. Fr. 1886, CLXVII. [Note on Megalemyia.]

27 Dipt. nouv. etc. XXXVII, Soc. Ent. Fr 1886, 277–302. [Synoptic table of Tanypezidæ, with notes; no new species.]

28 Bull. Soc. Ent. Fr. 1887, LX. [Notes on Thevenemyia and Epibates.]

29 Dipt. nouv. etc. 1887, 17–46, 203–208. [Table of species of Loxocera: Stratiomyidæ and Conopidæ: Oplacantha annulifera, 21, Ga.: Stratiomyia diademata, 23, Ga., Colo.; calopus, 23, Colo.; nevadæ, 24, Nevada; simplex, 24, Tex., Colo.: Odontomyia pyrrhostoma; 25, hoodiana, 25, Mt. Hood: Chrysochlora quadrilineata, 26, Cuba: Sargus punctifer, 27, Colo.: picticornis, 27, Wash. Terr.; pallipes, 28, Mt. Hood; saphireus, 28, Cuba Myochrisa cœrulia, 29, N. Amer.: Nemotelus tristis, Calif.. Genera of Conopidæ, 30; Conops nigrimanus, 38, ochreiceps, 39, Georgia; nigrifaceis, 40, carbonarius, 42, Mex.: Zodion triste, 203, Calif.; flavipennis, 204, zebrinum, 205, Mex.; Glossigona rubida, 206, Colo.; maculifrons, 206, Nevada: Gonorhynchus castaneus, 207, Nev.]

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30 BIGOT, J. F. M. Dipt. nouv. etc. Bull. Soc. Zool. de France, XII, 1887. [Leptidæ. Synoptic table of genera: Chrysopila flavida, Canad.; tomentosa, Colo.; anthracina, Calif.; testaceipes, Wash. Terr.: Leptipalpus limbipennis, Rocky Mts.; stigmatias, Cuba; obscuripennis, Rocky Mts.; vertebratus, Hayti: Symphoromyia latipalpis, Rocky Mts.; picticornis, Wash. Terr.; trivittata, Colo.; fulvipes, atripes, Oregon; comata, Calif.. Leptis maculifera, albibarbis, Wash. Terr.; pruinosa, hoodiana, Oregon; Atherix pachypus, Wash. Terr.: Clinocera maculipes, Calif.]

31 Dipt. nouv. etc., Bull. Soc. Zool. France, XII, 1887, 587–617. [Muscidæ. Notes, synoptic table of genera. Nitellia glabricula, 594, Calif.: Pollenia obscura, 597, N. A.: Somomyia rufigena, 598, N. A.; iridicolor, 599, Cuba; rectinervis, 600, Rocky Mts.; xanthorhina, 602, Mex.; rupicola, 603, Rocky Mts.: Musca flavipennis, 605, Rocky Mts.; atrifrons, 607, Cuba, Mex.: Curtoneura fulvipes, 613, vittigera, 613, Mex.; anthomydea, 616, Rocky Mts.; pallidicornis, 614, callimera, 615, Mex.; nigriceps, 615, Mex.: Pyrellia obscuripes, Mex.]

32 Dipt. nouv. etc. An. Soc. Ent. Fr. 1886, 369–392. [Micropezidæ: TETRADISCUS pictus, Rocky Mts.; notatus, Mex.; Nerius plurivittatus, 372; flavifrons, 372, Mex.: Calobata callichroma, 373, calocephala, 375, Mex.: Tæniaptera callosoma, 379, pallidipennis, 380, ornatipes, 380, Mex.: Grallomyia calloptera, 81, Mex.: Megamerina fulvida, 384, Mex.: Cephalia ? maculipennis, 385, Rocky Mts.; ? fulvicornis, 386, Calif.: Odontomera ? setosa, 386, Wash. Terr. Micropeza obscura, 387, Mex.: Enicopus ? fuscus, 388, Mex.: Nemopoda fulvicollis, 390, aterrima, 390, Calif.; cubensis, 390, Cuba; obscuripennis, 392, Calif.]

33 Note sur la Synopsis of the North American Syrphidæ par Mr. S. W. Williston. Bull. Soc. Ent. Fr. 1887, CXXI-CXXIII.

34 BERGROTH, E. Ueber einige nordamerikanische Tipuliden. Wien. Ent. Zeit. VII, 193–201, 1888. [Dicranomyia venusta, 194, Sitka: Molophilus colonus, 195, falcatus, 196, paulus, 196, Sitka: Gonomyia galactoptera, 196, Sitka; Trichophona septentrionalis, 199, Sitka: Pachyrhina Wulpiana, 200, Calif.: notes on seven other species.]

35 BRAUER, FRIEDRICH. Versuch einer Characteristik der Gattungen der Notacanthen, etc. Denschr. d. math.-naturw. Cl. d. kais. Alkad. d. Wissensch. XLIV, 59–10, 1882. [Synoptic table of genera; CYNIPIMORPHA Bilimecki, 75, Mex.: MYXOSARGUS fasciatus, 77, Mex., Carolina.]

36 Systematische-zoologische Studien. Sitzenberichte der kais. Akad. der Wissenschaften, XCI, 1 Abtheilung, 237–414, plate. [Asilus mydas; 151, Mex.: Calobata ichneumonea, 152, both figured.]

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37 BURGESS, EDWARD. United States Agricultural Report, for 1879, pp. 201, 202. [Oscinis trifolii, 201, D. C; malvæ, 202, D. C.]

38 COMSTOCK, J. H. United States Agricultural Report, for 1880. [Diplosis catalpæ, 266, larva and adult: Drosophilæ, 190-202; Sciara ocellaris O. S. 204.]

39 COQUILLETT, D. W. Monograph of the Lomatina of North America. Canad. Entom. 1886, 81–87. [Tables: EUCESSIA rubens, 82, Calif.: Leptochilus transitus, 83, Calif.: Aphœbantus litus, 84, hirsutus, 85, vittatus, 86, pavidus, 87, Calif.]

40 The North American genera of Anthracina. Canadian Entomologist, 1886, 157–159. [Table of genera: VELOCIA (Hyperalonia) cerberus Fabr., 158; MANCIA nana, 159, Calif.]

41 The North American species of Toxophora. Entom. Amer. I, 221, 222, 1886. [Table of species; notes; Toxophora pellucida, 222, maxima, 222, Calif.]

42 Notes on the genus Exoprosopa. Canad. Entom., XIX, 12–14, 1887. [EXOPTATA divisa, 13, Calif., Ariz.]

43 Monograph of the species belonging to the genus Anthrax from America north of Mexico. Trans. Amer. Ent. Society, XIV, 159–182, 1887. [Table of species: descriptions of known species; numerous synonymical notes: Anthrax (Dipalta) junctura, 163, Calif.; (Dipalta) Keenii, 164, Ariz.; ænea, 165, Calif.; nebulo, 165, Wash. Terr.; concessor, 165, Calif.; Mercedis, 166, turbata, 168, Anna, 189, supina, 169, inops, 169, eudora, 169, capræa, 170, Calif.; inaurata, 170, Calif., Wash. Terr.; lauta, 171, agrestis, 171, campestris, 171, atrata, 171, Calif.; miscella, 171, Wash. Terr., Calif.; scitula, 172, vana, 173, syrtis, 173, cautor, 175, adumbrata, 176, perplexa, 176, vigilans, 176, fumida, 177, Calif.; impiger, 177, Ariz.; dispar, 177, Fla.; plagosa, 378, Ariz.; nugator, 178, mira, 179, Calif.; Willistonii, 181, Cal., N. M., Colo.; effrena, 182, arizonensis, 182, otiosa 182, Ariz.]

44 DAY, LOREN T. The species of Odontomyia found in the United States, Proc. Acad. Nat. Sc. Philadelphia, 1882, 74–88. [Description of known species; Odontomyia nigra, 75, Kans.; flava, 76, Wyo.; pilosus, 76, Calif.; pubescens, 77, Calif., N. Y.; americana, 77, Calif.; bicolor, 78, Calif.; Willistoni, 78, N. Y.; extremis, 80, Conn., Calif.

45 Notes on Sciomyzidæ with descriptions of new species. Canadian Entomologist, 1881, 85–89. [Notes; Tetanocera pubescens, 86, Wash. Terr.; montana, 87, Wyo.; lineata, 88, Conn.; Dryomyza pallida, 89, Conn.]

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46 DUGES, ALFREDO. Adelopus Copei, Argas Sanchezi, y Ornitomyia Villadæ. La Naturaleza, (2) I, 18–21, 1887. [Ornithomyia Villadæ, 19, parasitic on Buteo calurus and B. Bairdii, Mexico.]

47 FYLES, T. W. Description of a dipterous parasite of phylloxera vastatrix. Canad. Entom. XIV, 237–239, 1882. [Diplosis grassator.] Ibid. XV, 84. [Cecidomyia grassator, teste Hagen.]

48 HAGEN, HERMAN A. New species of Simulium with a remarkable Nympha Case. Proc. Bost. Soc. Nat. Hist. XX, 305–307, 1879. [Simulium pictipes.]

49 KARSCH, F. Die Spaltung der Diptern Gattung Systropus Wiedemann. Zeitschr. Berl. Entomol. Gesellsch. 654–658. [Cephenus angulatus, 657, infuscatus, 657, Tex.; imbecillus, 658, Ga.]

50 KEEN, E. L. List of Diptera taken in the vicinity of Philadelphia, from 1882 to 1884, inclusive. Canad. Entom., XVII, 51–55, 1885.

51 List of Syrphidæ taken in Fairmount Park, Philadelphia, Pa., during the summer. Canad. Entom. XVI, 145–147, 1884.

52 LOEW, HERMANN. Table for determining the North American species of the Genus Pachyrhina. Verh. Zool.-Bot. Gesellsch. 1879, 513–516. [Introductory note by C. R. Osten Sacken.]

53 Neue nordamerikanische Ephydrinen. Zeitsch. f. d. Gesammten Naturwissenschaften, LI, 192–203, 1878. Notiphila macrochæta, 192, Texas; avia, 193, Hudson's Bay Terr.; erythrocera, 194, Cuba: Paralimna decipiens, 195, Texas: Psilopa æneo-nigra, 196, pulchripes, 197, Texas; atrimana, D. C., Texas: Athyroglossa glaphyropus, 197, Texas: Pelina truncatula, 198, Texas: Parydra pinguis, 199, D. C., Texas; unituberculata, 230, D. C.; imitans, 201, Mass.; limpidipennis, 201, D. C.; appendiculata, 202, Texas.

54 MARTEN, JOHN. New Tabanidæ. Can. Entom. XV, 110–112 [Tabanus Allyni, 110, N. C.; Therioplecticus tetricus, 111, Frenchii, 111, susurrus, 111, Mont.]

55 MIK, JOSEF. Dipterologische Miscellen. Wien. Ent. Zeit. V, 276–279, 1886. [LEPIDOSTOLA, nom. nov. for Lepidomyia Loew, 278.]

56 OSTEN SACKEN, CHARLES ROBERT v. Die Tanyderina, eine merkwuerdige Gruppe der Tipuliden. Verh. Zool.-Bot. Gesellsch. 1879, 517–522. [References to American species.]

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57 MIK, JOSEF. Ueber die Artrechte von Trochobola cæsarea O. S. und Cyrtopogon Meyer-Duerii Mik. [Discusses the species of Trochobola.]

58 Hypocharassus gladiator, eine neue Dolichopoden-Art aus Nordamerika. Verh. Zool. Bot. Gesellsch. 1878, 617–632, pl. X. [Genus new, p. 617.]

59 Dipterologische Bemerkungen. Verh. Zool. Bot. Gesellsch. 1883, 182–192. [Drosophila uvarum Rond. the same as D. ampelophila Loew: remarks on Sciara ocellaris Comst. (O. S.)]

60 OSTEN SACKEN, C. R. v Prioritæt oder Continuitæt ?, Wien. Ent. Zeit. I, 191–193, 1882. [Refers to a number of pre-occupied genera occurring in N. A.]

61 On Professor Brauer's paper: Versuch einer Characteristik der Gattungen der Notacanthen, 1882. Berl. Ent. Zeitschr. XXVI, 1882, 363–380. [Numerous important notes on generic characters. See 117]

62 On the genus Apiocera. Berl. Ent. Zeitschr. XXVII, 287–294, 1883. [Discusses the characters, locating the genus with the Asilinæ: synopsis of the known species.]

63 Synonymica concerning exotic dipterology. No. II, Berl. Ent. Zeitschr. XXVII, 295–298, 1883. [Dialysis Bigot, Hermetia chrysopila, synonyms; ALLOGNOSTA for the N. A. species of Metoponia, 297.]

64 A singular North American fly. Berl. Ent. Zeitschr. XXVII, 299, 300, 1883. [Opsebius pterodontinus, Tex. This sp. also occurs in Canada.]

65 Facts concerning the importation or non-importation of Diptera in distant countries. Trans. Ent. Soc. Lond. 1884, 489–496: [Eristalis tenax, Sarcophaga carnaria, Psilopus pallens, Syrphus pyrastri.]

66 Correction to my article on Apiocera. Berl. Ent. Zeitschr. XXX, 139, 1886. [The neuration of Philippi's type of A. brevicornis is like that of other Apioceræ, notwithstanding the figure.]

67 Studies on Tipulidæ. Part I. Review of the published genera of the Tipulidæ longipalpi. Berl. Entom. Zeitschr. XXX, 153–188. [Valuable discussions and descriptions of the known genera, synopsis of Ctenophoræ, etc.: BRACHYPREMNA, for Tip. dispellens Walk. et alia.]

68 Studies on Tipulidæ. Part II. Review of the published genera of the Tipulidæ brevipalpi. Berl. Ent. Zeitschr. XXXI, 163–242. [A similar discussion on the Tip. brevipalpi: notes on Rondani's and Bigot's classifications, with synonymy; addenda and corrigenda to Part I.]

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OSTEN SACKEN, C. R. v.

69 Biologia Centrali-Americana, Diptera. pp. 1-216, plates I-III, 1886, 1887. [A most valuable work, containing a review or lists of the described diptera of Central America, with notes, synonyms, analytical tables, etc. Numerous species are described, but not named: Teucolabis molesta, 6, gracilis, 7, Mex.: Patropesa præusta, 8, Mex.: Epiphragma circinata, 9, Costa Rica; Eriocera mesoxantha, 10, zonata, 10, hæmorrhoa, 11, Mex.; erythræa, 11, Guatem,; gracilis, 12, pretiosa, 12, Mex.; lessepsi, 13, Panama: Tipula virgo, 14, Mex.: Pachyrrhina ordinaria, 16, Mex.; consularis, 17, Costa R., Nicar., Venez.; usta, 17, Costa R.; TANYPREMNA opilio, 19, Guatem.: OLBIOGASTER (Rhyphidæ) 20, cognatus, 21, Costa R.: Subula elongata, 22, Guatem.: Sargus concinnus, 23, Guatem.: Ptecticus figlinus, 24, Guatem.: Rhaphiocera pampinus, 25, Panama; caloptera, 26, Mex.: Hermetia crabro, 29, Guatem.; relicta 30, formica, 32, pterocausta, 33, Panama; Cyphomyia androgyna, 34, Panama: AOCHLETUS (Stratiomyidæ), 38, cinctus, 38, Mex.: Euparyphus tricolor, 40, ? decem-maculatus, 40, Mex.: Acanthina argentea, 41, Costa R.: Pangonia pyrausta, 43, Panama; caustica, 44, Mex.: Chrysops altivagus, 45, Mex.; tanycerus, 46, Costa R.: Diclisa misera, 47, Guatem.: Tabanus ebrius, 49, Costa R., Panama; erebus, 50, Nicar., Panama; corone, 51, Guatem.; bifenestratus, 52, cribellum, 52, Mex.; chionostigma, 54, Guatem.; venenatus, 54, Guatem., Panama: Rhachicerus bellus, 62, Panama: Acanthomera championi, 67, Mex.: Leptomidas sponsor, 68, Guatem.; brachyrhynchus, 69, Mex.: Midas decor, 71, Panama; chrysites, 72, cleptes, 72, Mex.: Hirmoneura psilotes, 74, Mex.: Exoprosopa rhea, 83, limbipennis, 84, Mex.; procne, 85, Guatem., rostrifera, 86, filia, 86, socia, 87, pardus, 88, Mex.: Hyperalonia dido, 91, Mex.; latreillei, 93, Mex.; Guatem., Panama: STONYX (Exoprosopa) 94, clelia, 95, Mex.: ISOPENTHES (near Hemipenthes), 96, Jænnickeana, 97, Mex.: Argyramœba seriepunctata, 103, daphne, 104, Mex.: ASTROPHANES (near Anthrax) 106, adonis, 107, Mex.: LEPIDANTHRAX (Anthrax), 107,, angulus, 111, Calif., Mex.: Anthrax arethusa, 116, Mex., Guatem., Costa R.; pœcilogaster, 118, Calif. Mex.; selene, 122, Mex.; galathea, 123, Costa R.; ephebus, 124, cuniculus, 125, Mex.; consul, 125, Guatem.; rex, 127, Mex.; lepidota, 130, chimæra, 131, eumenes, 131, scylla, 132, Mex.; (HYALANTHRAX) faustina, 136, (id.) sabina, 137, (id.) moneta, 138, (id.) livia, 139, (id.) agrippina, 139, Mex: EPACMUS, 142: Aphœbantus cyclops, 146, Mex.; rattus, 147, Texas; conurus, 148, Calif.; bisulcus, 148 Mex.: carbonarius, 149, Washington Territory, Kansas, Mexico; peodes, 149, Mexico: Pantarbes pusio, 153, Mex.; willistoni, 153, Ariz.: Paracosmus morrisoni, 155, Mex.: Phthiria consors, 155, Mex.: Systropus rogersi, 158, Costa R.; cerdo, 158, Panama; lugubris, 159, rufiventris, 159, Mex.: Eclimus ? auripilus, 161;

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70 RILEY, C. V. Parasites of the Cotton Worm. Can. Entom. XI, 161, 162, 1879. [Tachina aletiæ, 162. ? Phorocera, ? Exorista.]

71 Dipterous enemies of the Phylloxera vastatrix. Can. Ent. XV, 39. [Criticism of Dip. grassator Fyles; Leucopis phylloxeræ (Agromyzidæ), not described.]

72 United States Agric. Report for 1885. [Diplosis? nigra Meig. (pyrivora), Conn.]

73 Buffalo Gnats. U. S. Agric. Report for 1886, 492–516, pl. VII, 1887. [Simulium pecuarum, 512, meridionale, 513, Southern States.]

74 Beschreibung einer den Birnen schædlichen Gallmuecke (? Diplosis nigra Meig.) Wien. Ent. Zeit. VI, 201–206, 1887. [Diplosis pyrivora—name provisional—203. adult, larva, pupa.]

75 RŒDER, V. v. Ueber die Zusammengehœrigkeit der beiden Arten der Gattung Sphecomyia Latreille. Entom. Nachr. 1879, 96–98. [Identity and synonymy.]

76 Dipteren von der Insel Portorico. Stett. Ent. Zeit. 1885, 337–349. [Megarrhina portoricensis, 337; Eriocera trifasciata, 338; Pelastoneurus fasciatus, 341, Ocyptamus fasciatus, 342: Tricopoda flava, 343. Ocyptera atra, 344, minor, 344; Exorista tessellata, 345; Frontina rufifrons, 346; Micropeza limbata, 347; Nerius cinereus, 348: notes on numerous other species.]

77 Ueber die nordamerikanischen Lomatina von Mr. Coquillett in dem "Canadian Entomologist." Wien. Ent. Zeit. V, 263–265, 1886. [Notes and comments.]

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78 RŒDER, V. v. Ueber drei neue Gattungen der Notacanthen. Ent. Nachr. XII, 137–140, 1886. [Cont., inter alia, note on Myxosargus.]

79 Dipterologische Notizen. Berl. Ent. Zeitschr. XXV, 210-216. [EURYCEPHALA myopæformis (Ortalidæ), 212, Calif.: note on Hemyda (Ocyptera) aurata R. Desv.]

80 Asyndulum montanum, n. spec. Wien. Ent. Zeit. VI, 116, 1887. (White Mts.)

81 Ueber eine neue Art der Gattung Gnoriste Mg. Wien. Ent. Zeit. VI, 155–156, 1887. [Gnoriste megarrhina O. S., White Mts., Yosemite Valley.]

82 Aus der Isis von Oken. Published by the Author. 1 p. 1888. [Excerpt, with synonymy of Hammerschmidtia ferruginia Fallen.]

83 WHITNEY, C. P. Descriptions of some new species of Tabanidæ. Canad. Entom. XI, 35–38, 1879. Chrysops cuclux, 35, N. H.; nigribimbo, 36, N. H.; cursim, 36, N. H.: Tabanus superjumentarius, 37, N. H.: Dodgei, 37, Nebr.; sparus, 38, N. H. For protest against the use of these names, see Burgess, same vol. p. 80.]

84 WILLISTON, S. W. An anomalous Bombylid. Can. Entom. 1879, 215–216. (Anthrax Willistoni Coq.)

85 Some interesting new Diptera. Trans. Conn. Acad. IV, 243–246, 1880. Rhynchocephalus Sackenii, 243, Wash. Terr.: Silvius pollinosus, 244, Kans.: Chrysops discalis, 245, Wyo.]

86 The North American Species of Conops. Trans. Conn. Acad IV, 325–342. [Monograph of the genus: Conops obscuripennis, 328, Va., S. C., Ga., Mass.; sylvosus, 329, Mass., Conn.; xanthopareus, 332, Tex., Mass.; furcillatus, 336, White Mts.; Burgessi, 337, Colo., Calif.; texanus, 338, Tex.; affinis, 339, Kans., Cal., Wash. Terr.]

87 New or little known genera of North American Syrphidæ. Can. Entom. 1882, 77–80. [BRACHYMYIA lupina, 77, nigripes, 78, Calif.: HADROMYIA grandis, 78, Wash. Terr.: Brachypalpus pulcher, 79, Or., Wash. Terr.: EUGENIAMYIA rufa, 80, Wash. Terr. Superseded by No. 103.]

88 North American Conopidæ: Stylogaster, Dalmannia, Oncomyia. Trans. Conn. Acad. VI, 87-94. [Description of genera and species: Stylogaster neglecta, 87, Conn.: Dalmannia picta, 90, N. M.: Oncomyia modesta, 96, Wash. Terr., Calif.; Baroni, 97, Calif., Colo.]

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89 WILLISTON, S. W. Dipterous larvæ from the Western Alkaline Lakes and their use as Human Food. Trans. Conn. Acad. VI, 83–86, 1883. [Habits of larvæ; fig. of puparium; descr. of Ephydra californica.]

90 Contribution to a Monograph of the North American Syrphidæ. Proc. Am. Phil. Soc. XX, 299–332, 1882. [Table of genera, notes, descr. of 23 new species; all superseded by No. 103.]

91 The North American species of Nemistrinidæ. Can. Entom. 69–72, 1888. [Table of species: Rhynchocephalus volaticus, 71, Fla.]

92 On the North American Asilidæ (Dasypogoninæ, Laphrinæ), with a new genus of Syrphidæ. Trans. Amer. Ent. Soc. XI, 1–36, pls. I, II, 1883. [Table of genera; notes; Myelaphus rufus, 7, Calif.: Dioctria nitida, 8, Sackeni, 8, Wash. Terr.: Triclis tagax, 9, Calif.: ? Habropogon bilineatus, 11, Calif. Cyrtopogon dasylloides, 11, præpes, 12, Wash. Terr.; dubius, 13, Or.; ? gibber, 14, Calif.: Nicocles abdominalis, 17, Calif.; rufus, 18, ? scitulus, 19, Wash. Terr.: LESTOMYIA fraudigera, 21, Calif.: ? Taracticus brevicornis, 22, Wash. Terr.: Dasyllis unicolor, 26, Wash. Terr.: Hyperechia atrox, 28, Pa.: Laphria anthrax, 29, Calif.; ferox, 29, vivax, 30, Wash. Terr.; canis, 31, Conn.; xanthippe, 31, Or.; pubescens, 33, Wash. Terr., Or.: NAUSIGASTER punctulata, 34, N. M.]

93 Ueber Mallota cimbiciformis Fallen. Berlin. Entom. Zeitschr. XXVII, 171, 172. [Synonymy, dimorphism.]

94 Notes on Injurious Insects: Entomological Laboratory, Lansing, Mich. By Prof. J. A. Cook, 1884. [Scopolia sequax, p. 5, fig. Mich.]

95 Eine merkwuerdige neue Syrphiden-Gattung. Wien. Ent. Zeit. III, 185, 186, 1884. [EUCERATOMYIA Pergandei, 1886, D. C.]

96 On the classification of North American Diptera (first paper), Syrphidæ. Bull. Brooklyn Ent. Soc. VII, 129–139, 1885. [Table of genera, superseded by No. 103.]

97 On the classification of North American Diptera (second paper). Entom. Amer. I, 10–13. [Definition and generic tables of Tabanidæ and Leptidæ: notes: APATOLESTES comastes, 12, Calif.]

98 On the classification of North American Diptera (Third paper.) Entom. Amer. I, 114, Sept., 1885. [Definition and generic tables of Xylophagidæ and Stratiomyidæ: notes: SCOLIOPELTA luteipes, White Mts.]

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99 WILLISTON, S. W. North American Conopidæ: Conclusion. Tr. Conn. Acad. VI, 377–394, Plate XLI, 1885. Completion of monograph of family, with tables of genera and species: Conops gracilis, 377, Ariz.; fronto, 378, Kans.: Zodion pictulum, 379, N. M.; leucostoma, 380, Kans., Mont., Ariz.; pygmæum, 381, Calif., Colo.: Myopa pictipennis, 382, Ariz., Calif.; pilosa, 383, Calif.; plebeia, 384, Ariz.]

100 . Notes and descriptions of North American Xylophagidæ and Stratiomyidæ. Can. Entom. 1885, 121–128. [Notes: Xylophagus decorus, 121, Wash. Terr.; gracilis, 122, Oregon, Wash. Terr.: Subula parens, 122, Wash. Terr.: Macrosargus clavis, 123, Va., N. C.: Ptecticus Sackenii, 124, Fla.; similis, 124, Va., Ga.: Hermetia Comstocki, 125, Ariz.. Euparyphus ornatus, 126, Wash. Terr.: Clitellaria argentata, 127, Ariz.]

101 On the North American Asilidæ (Part II). Trans. Amer. Ent. Soc. XII, 53–76, 1885. [Notes on Dasypogoninæ; table of Laphria; gen. and sp. tables and descr. of Asilinæ, excl. Asilus, sens. lat.: Aphamartania fur, 53, Ariz.; Laphria ventralis, 55, Calif.; ruficauda, 55, San Dom.: Andrenosoma chalybea, 56, San Dom.; Mallophora nigra, 58, Minn.: Guildiana, 60, Kans., Mont., N. C.: Promachus princeps, 62, Wash. Terr.; albifacies, 63, Ariz.: Erax tagax, 65, Ariz.; jubatus, 66, N. M.; latrunculus, 67, Ariz., Mont.; furax (syn. cinerascens), 61, Wash. Terr., Calif., Kans., Ariz., Conn.; stamineus, 68, Mont.; dubius, 64, 68, Wash. Terr.; similis, 68, Ariz.; leucocomus, 69, Kans.; varipes, 71, Ariz., Kans.: Proctacanthus rufus, 72, N. C., Mass.]

102 On two interesting new genera of Leptidæ. Entom. Amer. II. 105–108, 1886. [Notes on structural characters: AGNOTOMYIA (Stygia) elongata Say, 106, Conn.: ARTHROCERAS, 107, pollinosum, 108, Cal. Col.]

103 Dipterological Notes and Descriptions. Trans. Amer. Ent., Soc. XIII, 287–307. [Notes and descr. Leptidæ, Asilidæ, Midasidæ, Nemistrinidæ, Therevidæ, Cyrtidæ, Dolichopidæ, Pipunculidæ, Muscidæ, sens. lat.: Symphoromyia pachyceras, 287, Calif.; plagens, 287, Wash. Terr., Or.: Ceraturgus nigripes, 287. Ga.: Stenopogon æacidinus, 289, Kans.: Atomosia (Atractia) Mikii, 290, San Dom.: Midas scitulus, 291, Ariz.: Ectyphus limbatus, 292, Ariz.: Hirmoneura flavipes, 292, Fla.: Thereva crassicornis (nom. preoc.) 293, Calif.: Acrocera liturata, 294, Wash Terr.: Pipunculus opacus, 295, Wash. Terr.: Hyalomyia æneiventris, 296, Wash. Terr.: Dejeania hystricosa, 297, Wash. Terr., N. M., Ariz.: Hystricia soror, 298, Ariz.: Jurinia (Fabricia) hystricoides, 300, Conn., D. C., Va., Ga., N. M., Ariz.: Echinomyia (Peleteria) Thomsoni, 302 (E. fllipalpis Thom.), Wash. Terr., Calif., N. M.; Gymnochæta vivida, 302, rufi-

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cornis, 302, Penna.: Belvoisia v. d. Wulpi, 303, San Dom.: Saundersia maculata, 304, N. M.; bicolor, 304, N. M., Ariz., Calif., Wash. Terr.: MELANOPHRYS flavipennis, 306, Wyo., Calif.]

104 Synopsis of the North American Syrphidæ. Bull. U, S. Nat. Mus. No. 31, 1886. pp. I-XXX, and 1-335, pls. I-XII. [A monograph of the genera and species north of Mexico. with descriptions or lists of those in Central America and West Indies. Supersedes all the author's previous papers on this family.]

105 North American Tachinidæ. Gonia. Can. Entom. 1887, 6. [Notes: table and description of species: Gonia senilis, Kans.; porca, Or.; exul, Conn., Mass., N. Y.; sequax, Calif.]

106 Table of the Families of Diptera. Trans. Kansas Acad. of Science, X, 122-128, 1888.

107 Notes and Descriptions of North American Tabanidæ. Trans. Kans. Acad. of Science, X, 129-142, 1888. [Notes and descriptions of sixty-four species; supplementary tables of species; Pangonia fera, 130, Or.; dives, 130, Calif.: Chrysops pertinax, 132, Wash. Terr.; Frazari, 130, San. Dom.; sequax, 138, Kans.; pachycera, 134, Calif.: Tabanus sequax, 137, Or.; comastes. 137, Wash. Terr., Or.; sodalis, 139, Conn.; fur, 139, Fla.; fratellus, 140, Wash. Terr.; pygmæus, 141, Fla.; parvulus, 141, San Dom.; fenestra; 141, San Dom.]

108 WOODWORTH, C. W. Gonia senilis Williston. Psyche, V, 42, 1888. [Note on variation; Texas.]

109 WULP, F. M. v. d. Quelques Dipteres Exotiques. Comptes rendus de la Soc. Entom. de Belgique, 1884. [Hystricia cyaneiventris, Guanaxuato.]

110 Amerikaanische Diptera. Tijdschr. voor Entom. XXIV, 141-168, pl XV, 1881. [Notes: Trichonta perspicua, 142 (Mycetophilidæ), Quebec: Tipula retorta, 149, vitrea, 150, Quebec], XXV, 77-136, pls. IX, X, 1882. [Anthrax melasoma, 80, Ariz.: Proctacanthus virginianus, 109, Va.] XXXVI, 1-60, pls. I, II, 1883. [Jurinia nitida, 18, Ariz.: Echinomyia lugubris, 20, Quebec: Calobata albiceps, 50, Quebec.]

111 Remarks on certain American Diptera from the Leyden Museum and descriptions of nine new species. Notes from the Leyden Museum, IV, 73-92, 1882. [Notes: Anthrax melasoma, 74, Ariz.: Jurinia nitida, 82, Ariz.]

112 Chrysops geminata Wied. und Macq. Wien. Entom. Zeit. III, 139-141, 1884. [Chrysops crassicornis, 141, Guanaxuato.]

113 Nalezing over Amerikaanische Diptera. Tijdschr. v. Entom. XXVII, 1-4, 1884. [Notes.]

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114 BIGOT, J. F. M. Bull. Soc Ent. Fr. 1887, CLXXII–CLXXIV. [Diagnoses of Calliphora xanthorina, Mex.; Somomyia rupicola, rufigena, rectinervis, iridicolor, Rocky Mts.: Pyrellia obscuripes, Mex.: Musca atrifrons, Cuba, Mex.; flavipennis, Rocky Mts.: Pollenia obscura, N. M.: Nitellia glabricula, Calif.: Curtoneura fulvipes, vittigera, anthomydea, Rocky Mts.; pallidicornis, callidimera, Mex.; nigriceps, Mex.—see No. 31.]

115 Bull. Ent. Soc. Fr. 1888, XXIX, XXX. [New species of Dolichopodidæ; Psilopodius hirtulus, Hayti: Psilopodinus pallescens, N. C.; pampœcillus, Hayti; carolinensis, Carolina; occidentalis, Calif; astequinus; Mex.: Spatichira pulchrimana, Rocky Mts.: Pœcilobothrus mexicanus, Mex.]

116 Dipt. nouv. ou peu connus. An. Soc. Ent. Fr. 1888, 77–101. [Tachinidæ, Dexidæ: Jurinia ? barbata, ganoides, Mex.: Hystricia fulvida, 79, N. A.: Echinomyia rubrifrons, 80, cora, 81, macrocera, 81, notata, 82, Mex.: Frontosia rufostylata, 83, chrysopygata, 84, Mex.: Fabricia infumata, 85, Mex.: Blepharopeza monticola, 91, Rocky Mts..; inermis, 91, N. A.; fulvipes, Wash. Terr.: Cryptopalpus flaviceps, 93, Rocky Mts.]

117 BRAUER, FRIEDRICH. Offenes Schreiben als Antwort auf Herrn Baron Osten Sacken's "Critical Review" meiner Arbeit ueber die Notacanthen. Vienna: published by the author, 1883. pp. 1–11.

118 Systematische Studien auf Grundlage der Dipteren Larven nebst einer Zusammenstellung von Beispielen aus der Literatur ueber derselben und Beschreibung neuer Formen. Denkschr. d. k. Akad. d. Wissensch. XLVII, 1-100, 4 pl. 1883.

119 COMSTOCK, J. H. Report upon Cotton Insects, 1879. (Phora aletiæ, 209-211.) The same, abridged, U. S. Agric. Rep. for 1879. (Tachina fraterna, 303.)

120 HAGEN, H. A. On Simulium. Canad. Entom. XIII, 150, 151, 1881. [Notes on various sp. of Simulum.]

121 List of North American Sarcophagidæ, examined by R. H. Meade, Esq., Bradford, England. Canad. Entom. XIII, 146–150, 1881. [Important notes on the Loew and O. S. collections, by both Meade and Hagen, with synoptic arrangement.]

122 List of North American Anthomyidæ, examined by R. H. Meade, Esq., Bradford, England. Canad. Entom. XIII, 43–51, 1881. [Valuable notes on the Loew and O. S. collections.]

123 KIRBY, W. Insects of the Northern parts of British America, compiled by Rev. C. J. S. Bethune. Canad. Entom. XIII, 1881, Diptera, pp. 164–169. [A useful reproduction of Kirby's Fauna Boreali-Americana.]

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123 LINTNER, J. A. On Cecidomyia legumenicola n. sp. Canad. Entom. XI, 121–124, 1879. [Substitution of the sp. name for trifolii Lintner, Can. Ent. XI, 44.]

124 LYNCH ARRIBALZAGA, ENRIQUE. Catalogo de los Dipteros hasta ahora descritos que se encuentran en las Republicas del Rio de la Plata. Bol. Acad. 119–152, 1883. [Distribution and synonymy of certain N. A. species.]

125 RILEY, C. V. U. S. Agric. Rep. for 1884, p. 322. [Oscinis brassicæ.]

126 WILLISTON, S. W. Fourteenth Rep. of the State Entomologist of Illinois. S. A. Forbes. [Exorista infesta, 65; by an error the first segment of the abdomen is called the second, etc.]

Writers on systematic dipterology of the present time, whose works should be consulted:

MEADE, VERRALL, England; BRAUER, MIK, Austria: BERGROTH. GIRSCHNER, HANDLIRSCH, KARSCH, OSTEN SACKEN, ROEDER, Germany; KOWARZ, Hungary; DZIEDZICKI, SCHNABL, Poland; VAN DER WULP, Holland; PORTSCHINSKY, Russia; BIGOT, GOBERT, France; COQUILLETT, WILLISTON, North America; Enrique and Felix LYNCH ARRIBALZAGA, South America.

Writers on economic entomology, whose works contain important references to American diptera:

COMSTOCK, New York; COOK, Michigan; FORBES, Illinois; LINTNER, New York; RILEY, U. S. Agricultural Department.

ADDENDA AND CORRIGENDA.

EXOPTATA Coquillett, Can. Entom. XIX, 13, 1887.—Bombylidæ.

"Third antennal joint furnished with a distinct terminal style; second vein issues from the third opposite or nearly opposite the small cross-vein; anterior branch of the third vein connected by a cross-vein with the second, forming three submarginal cells; first posterior cell divided into two cells by a cross-vein placed some distance before tip of discal cell: anterior branch of third vein and veins 2, 3, and 4 terminate in margin of wings; no pulvilli." Differs from Exoprosopa in having two first posterior cells.

ENOPLEMPIS Bigot, Bull. Soc. Ent. Fr. 1880, 62.—Empidæ.

"Generis Empidis proximum, maxime differt: Femoribus posticis robustis, subtus, apice, profunde mucronatis et unidentatis, tibiis intus, basi similiter mucronatis et unidentatis, dentibus villosulis,

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crassis. E. mira.—Testaceo fulvo; antennarum apice, haustello, femoribus posticis superne, thoracis lineis quinque, lateralibus interruptis, fuscanis; alis flavidis. Calif."

MEGACYTARUS, Bigot, l. c.—Empidæ.

"Quanquam abest ab antennis. Generis Ocydromyiæ vicinum, differt: Cellulis basalibus abbreviatis, et, discoidali longissima, lata, subtrigona, vena transversali, fortissime sinuosa et alarum marginis posticis proxima, clausa. M. argenteus.—5mm. Cinereus, vittis quatour thoracis, haustello, pedibus totis, abdominis extremo apice, alarum macula stigmaticali minuta, nigris; abdomine argenteo, alis hyalinis. Colorado."

HYPOCHARASSUS Mik, Verh. Zool. Bot. Gesellsch. 1878, 627.—Dolichopodidæ.

"♂ Hypostoma latum, sub oculos descendens absque tænia transversali elata, in parte inferiore convexum. Palpi exserti latiusculi, obtusi, proboscidi crassæ, obesæ incumbentes. Antennæ elongatæ: articulo primo superne setoso, secundo transverso, tertio lanceolato, subtus exciso: seta apicali crassa, styliformi, biarticulata, articulo primo brevi, secundo longiore ante apicem subincrassato. Frons latissima, hypostomate brevior. Oculi velutini. Thoracis dorsum setulis dense obsitum, setis dorsalibus interioribus nullis, ante scutellum non impressum. Scutellum seti quatuor marginalibus validioribus. Abdomen segmentis sex, subdepressum, postice obtusum; ante incisuras setis nullis. Hypopygium inclusum, appendicibus lamellatis, prominulis. Pedes validi: femoribus posticis setis præapicalibus nullis, metatarsis posticis setis nullis, elongatis; pulvillis anticis reliquis paullulum majoribus. Coxæ posticæ seta porrecta nulla. Alarum costa usque ad apicem nervi longitudinalis quarti ducta; nervus longitudinalis tertius et quartus arcuati, apicem versus convergentes; nervus longitudinalis sextus abbreviatus; nervus transversalis porterior segmento ultimo nervi longitudinalis quinti longior."

Page 5, line 10, read 'zweifluegelige'; line 13, read 'europaeischen.'

" 37, line 23, read 'RHABDOPSELAPHUS'.

" 38, line 26, read 'TOXOPHORA'; line 28, read 'RHABDOPSELAPHUS'.

" 72, line 9 from bottom, read 'Therioplectes'.

" 73, line 2, insert: Verh. Zool. Bot. Gesellsch. 1878, 617-626.

" 76. line 6 from bottom, read '104'; the same correction in Nos. 90 and 96.

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